DOCUMENT RESUME ED 076 055 EM 011 057 AUTHOR Hall, Keith A.; And Others TITLE Sample Computer Assisted Instruction Student Interactions. INSTITUTION Pennsylvania State Univ., University Park. Computer-Assisted Instruction Lab. SPONS AGENCY Bureau of Educational Personnel Development (DHEW/OE), Washington, D. C. Teachers Corps.: Pennsylvania State Univ. Foundation, University Park. REPORT NO PSU-CAI-R-53 PUB DATE Dec 72 NOTE 59p. 1 EDRS PRICE MF-\$0.65 HC-\$3.29 DESCRIPTORS *Computer Assisted Instruction: Handicap Detection: *Individualized Instruction; *Inservice Teacher Education; Mobile Classrooms; *Remedial Instruction; Teacher Education FORM **IDENTIFIERS** CARE 1; *Computer Assisted Remedial Education **ABSTRACT** To convey to those who have had no experience with computer-assisted instruction an impression of the experience that students have in a CAI course, this report presents in print the sequence of instruction that one student received from one chapter of 7 the course, Computer Assisted Remedial Education (CARE 1): Introduction to the Education of Exceptional Children. In addition to the content outlines, and pictures of the cathode ray tube throughout, comment is provided to make clear the flow of the course. (EM 011 037 through EM 011 043, EM 011 046, EM 011 047, and EM 011 049 through EM 011 058 are related documents.) (RH) 7) 7

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Note to accompany the Penn State Documents.

In order to have the entire collection of reports generated by the Computer Assisted Instruction Lab. at Penn State University included in the ERIC archives, the ERIC Clearinghouse on Educational Media and Technology was asked by Penn State to input the material. We are therefore including some documents which may be several years old. Also, so that our bibliographic information will conform with Penn State's, we have occasionally changed the title somewhat, or added information that may not be on the title page. Two of the documents in the CARE (Computer Assisted Remadial Education) collection were transferred to ERIC/EC to abstract. They are Report Number R-36 and Report Number R-50.

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SAMPLE COMPUTER ASSISTED INSTRUCTION STUDENT INTERACTIONS

K. A. Hall, G. P. Cartwright, C. A. Cartwright, H. E. Mitzel, and S. P. Wetcher

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Report No. R-53

The Pennsylvania State University Computer Assisted Instruction Laboratory

December, 1972



In November of 1970, the staff of the Pennsylvania State University inaugurated a new and sophisticated computer mediated instructional technology into its inservice continuing education program for teachers. The instructional program in special education is designed to assist regular classroom teachers in identifying the problems of handicapped children. The instructional program is given a wide audience by means of a specially designed Mobile Computer Assisted Instruction Laboratory. Since the beginning of the project, the Mobile CAL Laboratory has offered high quality college instruction to over 1,000 educators per year. A continuing interest of the University is to convey to others, many of whom have had no experience with computer-assisted instruction (CAL), a description, a feeling, or a flavor of the experience that the students (inservice teachers) have when they take the program of instruction. This report attempts to meet this goal by presenting in print the sequence of instruction that one student received from one chapter of the course while seated at his student station. Some background "stage setting" information is included also to help the reader recreate the "experience."

CARE

Professors G. Phillip Cartwright and Carol A. Cartwright led a team of University faculty members in developing the graduate level course entitled, "Computer Assisted Remedia (Education (CARE 1): Introduction to the Education of Exceptional Children." The purpose of the course is to give educational personnel the knowledge and skills necessary to deal effectively with children who have educational problems.

The CARE course is designed to prepare inservice preschool and primary level elementary teachers and other interested persons to know the characteristics of, and be able to identify, handicapped children. Handicapped children are defined, for purposes of this course, to be those children who have atypical conditions or characteristics which have relevance for educational programing. Handicapped children include children who display deviations from normal behavior in any of the following domains: a) cognitive, b) affective, and c) psychomotor.

The philosophy of the course is such that teachers are encouraged to look at children as individuals. The use of traditional categories or labels is minimal. However, certain terms and concepts related to handicapping conditions are taught so that persons who take this course are better able to communicate with other professionals in the field.

¹ The Mobile CAI Laboratory is currently supported by The Pennsylvania State University, the Penn State Foundation, and a grant from the Bureau of Educational Personnel Development, U. S. Office of Education. The development of the CARE course for computer presentation was funded by a grant from the Bureau of Education for the Handicapped, U. S. Office of Education.

Upon completion of CARE 1, participants will have achieved the following major objectives. These overall objectives are, of course, broken down into a series of sub-objectives and tasks—over 1,100 in all. Participants will:

- A. Know the characteristics of handicapped children and be aware of symptoms which are indicative of potential learning problems;
- B. Be able to screen all children in regular classroom programs for deviations and determine the extent of the inter-individual differences:
- C. Be able to select and use for those children with deviations appropriate commercial and teacher-constructed appraisal and diagnostic procedures in order to obtain more precise information as to the nature of the deviation;
- D. Be able to synthesize information by preparing individual profiles of each child's strengths and weaknesses on educationally relevant variables;
- E. Be able to evaluate the adequacy of the information available in order to make appropriate decisions about referral to specialists;
- F. Be able to prepare adequate documentation for the case if the decision to refer is affirmative.

It is expected that the teachers who exhibit the competencies listed above will systematically evaluate children's learning potential and formulate appropriate educational plans.

Facilities

To implement this program, a custom-built expandable van was fitted with a small, stand-alone computer and fifteen student stations (IBM 1500 Instructional System). Each student station (Figure 1) is equipped with a small cathode ray tube (CRT) on which is displayed alphameric information plus a wide variety of graphics including animated illustrations. Student response components of the CRT include a typewriter-like keyboard with upper and lower case characters and a variety of special characters and a light-sensitive pen used by the learner in making responses to displayed material. In addition to the CRT, each student station has a rear screen image projector on which are displayed color photographic images. A 1,000-frame reel of microfilm, with each frame separately addressable by the computer, is used in the image projector. The third major display component is an audio device with separately addressable pre-recorded messages played through a headset for each individual student.



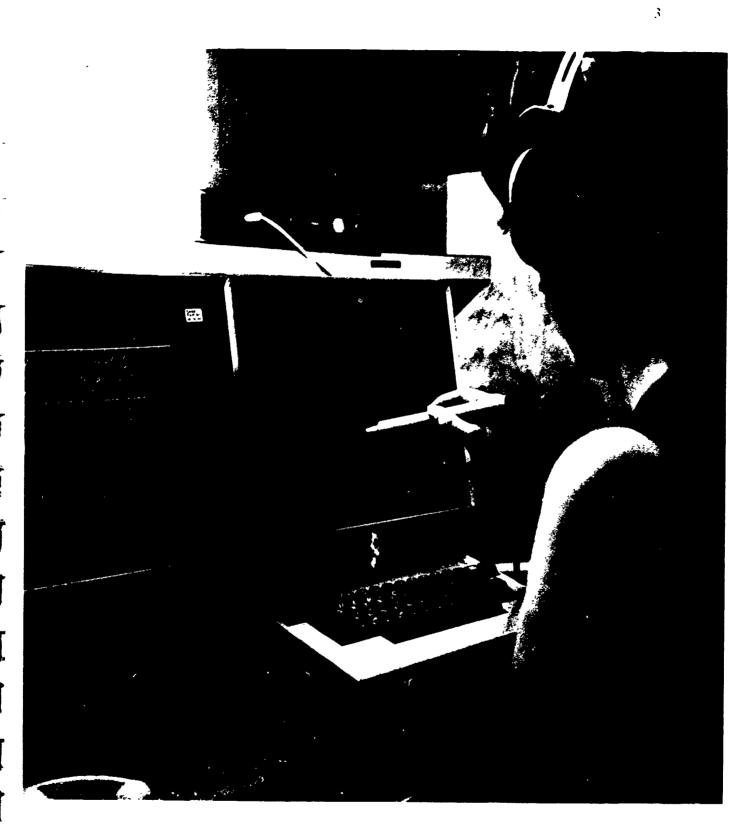


Figure 1.
Student at the Computer-Assisted Instruction Terminal.

Implementation

On a pre-arranged schedule, the Mobile CAI Laboratory is moved to a school in a rural community and connected to electric, telephone and water services. Over the next seven weeks, in late afternoon and evening hours, elementary teachers and their supervisors schedule themselves for one-to-three-hour sessions at computer student stations on flexible and irregular schedules to fit into the demands of their personal lives. During a seven week period the Mobile CAI Laboratory will accommodate approximately 125 to 150 learners who enroll for a typical three credit college level course. The students, of course, put in considerable time in home study of a 400 page textbook which accompanies the course. The Mobile Laboratory and this utilization plan are sufficient for providing instruction to more than 1,000 educators during a calendar year. However, the existing computer has sufficient power and capacity to support 15 additional student stations which would double the number of students served. Currently, the existing student stations and relocation scheduled every six weeks meet the needs of the target audience in a 25 mile radius.

Sample Instructional Sequence

A portion of Chapter 7, "Individual Differences and Normality," (written by Professor Harold E. Mitzel) was chosen for this presentation because of the wide variety of instructional strategies, presentation and response modes, and learning task complexities contained in the material. Chapter 7 develops teacher competencies in the area of educational measurement to enable the inservice teacher to properly interpret test scores which are commonly available to him in his school. Much of the content in Chapter 7 is intended to help teachers understand that a certain amount of deviation from the average is to be expected and that children should not be considered atypical if they deviate only slightly from the average.

For illustrative rurposes, three components are presented for each section of instruction: I. Content Outline, 2. Behavioral Objectives, and 3. Student Interactions. The content outline and the behavioral objectives are traditional in nature and are included to assist the reader of this document in understanding the student interactions. They are not presented to the student as he is taking the course.

The Student Interactions include material presented on the cathode ray tube, the image projector, and through the audio unit. Comments regarding the flow and sequence of the material are included. The key to the Student Interactions is presented in Table 1. In the live CAI situation, students need about two hours to complete the Chapter. For purposes of this document only, several portions of the chapter are excluded. Not all branches are shown and a number of sections are reduced in scope once the general format has been established.



Table 1 Key to Student Interactions

Item	Symbol	To the Student Working at the CAI Terminal	Fo the Reader of this Document
Cathode Ray Tube	CRT	Light blue figures on dark background	White figures on black background
		Animated -controlled by computer program	Staticanimation depicted by time-lapse photography
			Photographs of cathode ray tube
Image Projector	Image	Full color, still photographs	Black-and-white still photographs of original art work
		Randomly available ander program control	Reference is made to photograph through Comment
Audio	Aud i o	Recorded audio messages played through headset	Script of spoken messages
		Randomly available under program control	Appear in sequence created by the one student presented
		May be replayed at student option	May be re-read at reader option
	Comment		Directs reader through printed materials
			Describes steps performed by the computer
			Describes other alterna- tives used by the student



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ORGANIZING AND REPRESENTING DATA

Content Outline

I. Bar Graphs

- A. Present data about frequency or number of cases associated with labeled categories;
 - 3. Frequency dimension or number scale; only dimensions essential in bar graph

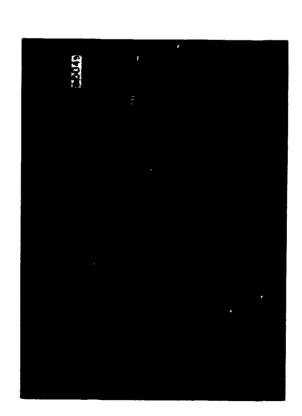
Behavioral Objectives

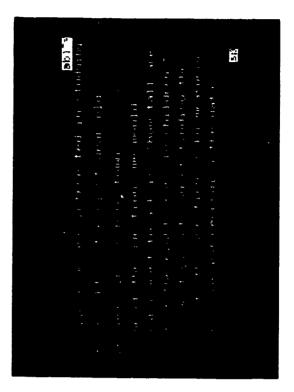
- Given heights of children, indicate each child's position on bar graph (alternate choice).
 - Indicate that one dimension is shown on bar graph (alternate choice).
- Recall bar graphs as type of data representation being discussed (completion).

Student Interactions

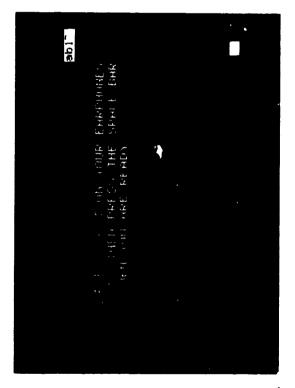
I-CRT

2-CRT





7

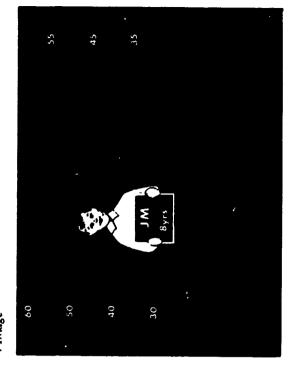


5-Audio

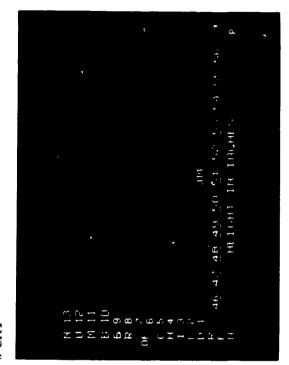
The name of the child you see on your image projector is John Middleton. You see by his birth certificate that he is 8 years old. By having John stand beside a measuring chart, we determine his height to be 51 inches. Let us record this information on our Cathode Ray Tube. First of all, notice that on the left margin of our screen is NUMBER OF CHILDREN, and at the bottom of the screen is listed HEIGHT IN INCHES. We are going to enter John's height on the screen by placing his initials directly above the number representing his height in inches. Since John Middleton is 51 inches tall, the letters J M will now appear above the number 51.

4-Image

8



6-CRT



7-Audio

Joining John at the measuring chart is Fred Fox. Fred, as we can see by his birth certificate, is also eight years old. But he is not as tall as John. Fred is only 48 inches tall. You can record Fred Fox's height on the screen by placing your light pen on the number representing Fred's height in inches.

9-Comment

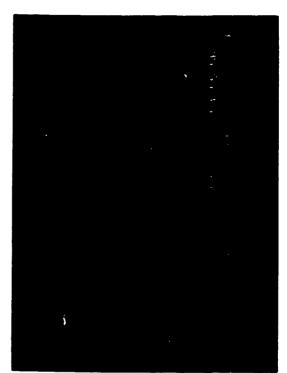
The P in the lower right corner of 10-CRT informs the student that he is required to make a light pen response. When the student touches "48" with the light pen, the computer places "FF" in the proper position to indicate to the student that he has correctly recorded the height of Fred Fox. The computer will then replace "FF" with "XX" as one step in building the bar chart shown completed in 13-CRT.

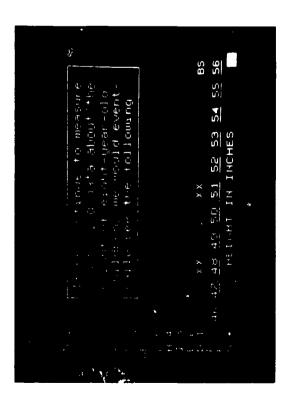
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8-Image

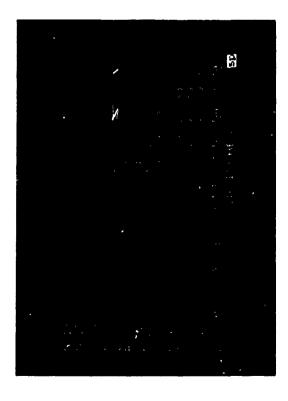


10-CRT





13-CRT



12-Comment

10

As the student watches, the program builds the bar graph illustrated in the completed stuge in 13-CRT.

14-Auaio

What we have constructed is essentially a vertical bar chart in which each pair of XX's represents one unit or one individual.

15-Comment

Several short-answer problems follow (not shown here) to provide the student with further tests of his acquisition of the important objectives.

Content Outline

II. Histograms

- A. Two-dimensional frequency chart
- Frequency represented by vertical bars
 Unit of measurement represented on
- B. Continuous variation

horizontal scale

1. Given measurement extends one-half unit below and one-half unit above measured value.

Behavioral Objectives

Type heights of children along horizontal axis of histogram (constructed response)

Conclude that 3 units on bar of histogram represent frequency of 3 (constructed response)

Conclude that the total number of units of a histogram represent the total frequency of the data (constructed response)

Student Interactions

16-Image



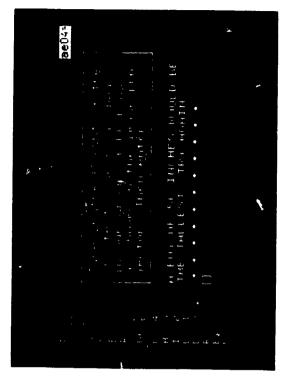




18-Comment

The student responded "56" which is incorrect (19-CRT). The response has been erased and appropriate feedback given. The cursor (small rectangular shape) and the "K" in the lower right corner of the screen indicate to the student that he is expected to respond again.

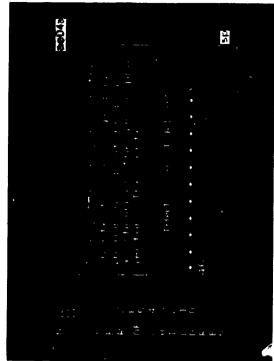
19-CRT



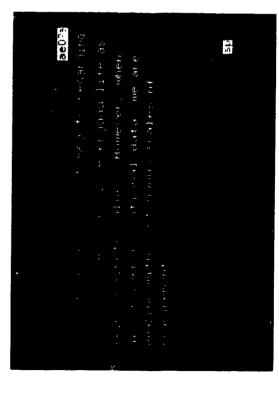
20-Comment

The student responded "46" and received the feedback, "THAT'S JUST RIGHT," as shown in illustration 21-CRT.

21-CRT



24-CRT

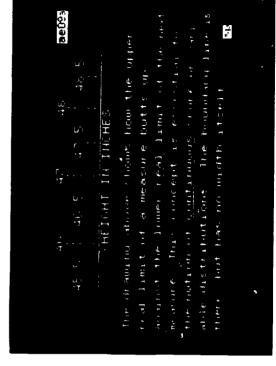


23-CRT

14

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25-CRT



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26-Comment

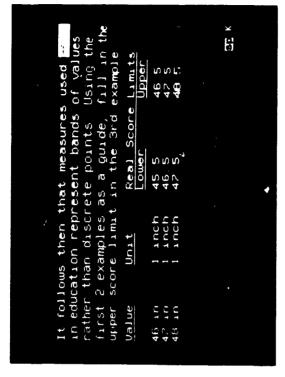
Value in the

27-CRT shows that the student responded "48.5" and received feedback. The lines around "48.5" are the result of time-lapse photography and the movement of the cursor as the student responded.

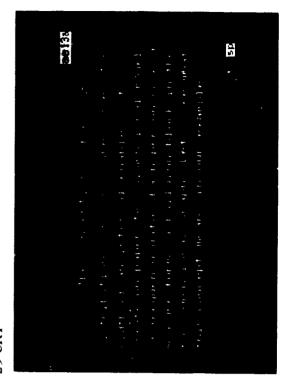
28-Comment

Additional practice problems (not shown here) are presented before the following text is presented.

27-CRT



29-CRT



30-Comment

16-Image is still visible to the student on the image projector and is referred to in the following interactions.

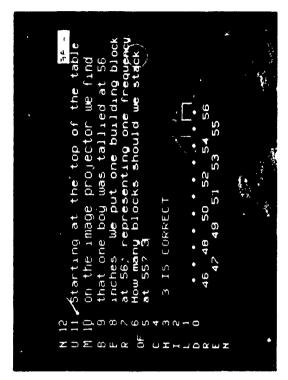
Time-lapse photography (31-CRT) shows that the student responsed "3," received feedback, "IS CORRECT," and is shown how that quantity is

represented on the graph.

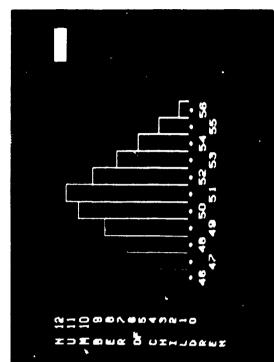
32-Comment

After the student has determined the total number of blocks in the graph by referring to 16-Image, the graph is constructed for the student in real time on the CRT.

31-CRT

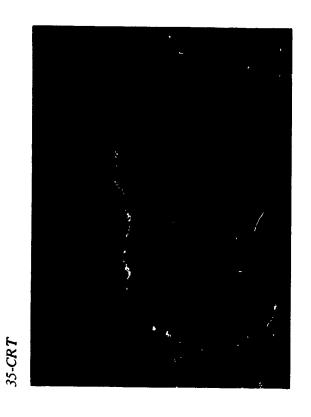


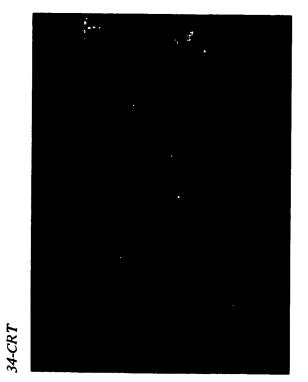
33-CRT



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FREQUENCY CURVE

Content Outline

- I. Normal Curve of Error-Theory
- A. Two dimensions: frequency and scale value
- B. Elements of scale dimension bear relationship to one another
 - C. Formed by connecting top of each interval column of histogram
- D. If unit of histogram, reduced to very small widths, smooth curve created which often has "bell shape"
 - . vertical dimension represents number of cases or frequencies
- 2. horizontal dimension represents continuous scale or measure
- 3. frequencies tend to pile up in middle of distribution and be extremely few at extremes
- total area under curve proportional to total frequency
- a. curve is symmetrical-50% of area falls
 below exact center of distribution and
 50% falls above
- 5. curved line approaches but never quite touches base line
 - E. Characteristics of normal curve are described precisely by mathematical formula called "Incomplete Beta Function"

Behavioral Objectives

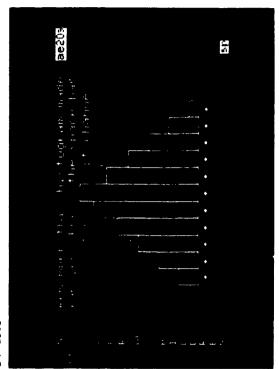
- Recall frequency as term for the number of cases in a distribution (short answer)
- Recognize that the horizontal dimension represents a continuous scale of measurement (multiple choice)
- Recall that cases tend to pile up in the middle of a distribution (completion)
 - Conclude that 50% of the area falls in the left half of the distribution (short answer)
- Conclude that the curved line never quite touches the base line because frequencies at the extremes of the distribution are rare (alternate response)

Student Interactions

36-Audio

The histograms we have just constructed represent in a graphical way all of the information we have so far about the heights of 66 boys. It would, however, be difficult to ranipulate this histogram in order to find a particular child's location in relation to all the other children or to compare the histogram of several groups. In short, histograms are awkward, so we need some other ways of looking at data.

37-CRT



39-Audio

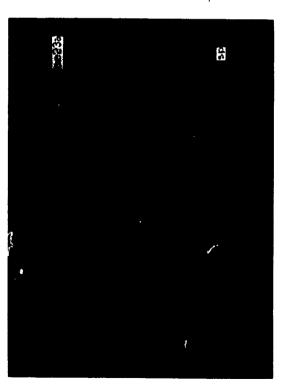
If our measures of boy's heights were accurate and recorded to the nearest half inch, the histogram of these measures would look like that shown on the screen now (38-CRT). Remember that the intervals in such an instance would extend one-quarter of an inch below the half-inch label and one-quarter of an inch above the label. If we extended the process to very, very narrow intervals, we would get the following:

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-







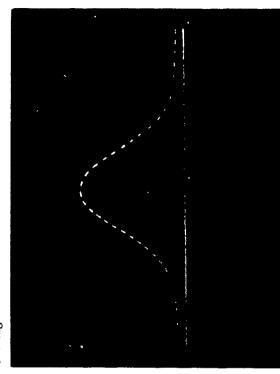
42-Audio

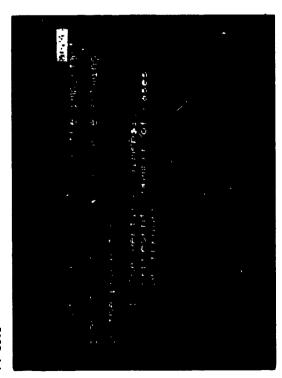
In the instance of the heights of boys, we would anticipate a definite smoothing of the tops of the intervals. And, if we had a very large sample, the histogram of the heights of eight-year-old boys would look like that shown on the projector (43-Image). Note that a curved line has been passed through the tops of the histogram columns. For the remainder of this section, we will use the curved line to represent distributions and omit the mass of vertical lines.

41-Audio

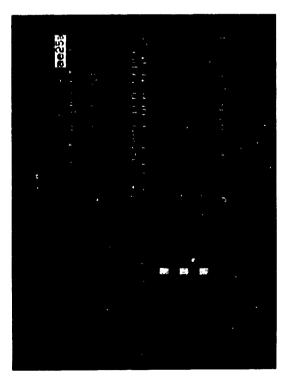
The shape of the histogram is partly a function of the number of cases on which measurements are taken. It is both intuitively and scientifically sound to expect small samples to show greater fluctuations or deviations from one another than large samples do.

43-Image





46-CRT



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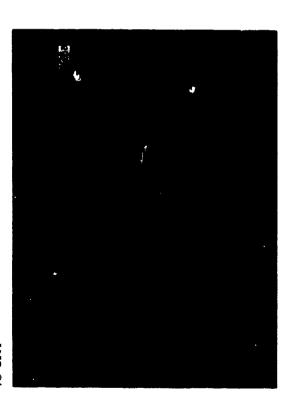
45-Comment

22

The student responded "frequency," received feedback "correct," and is ready to proceed to the next question in the review.

47-Comment

The correct answer (46-CRT) is "continuous." Had the student indicated either of the two wrong responses, the following feedback would have been presented to him NO. REMEMBER THE BAR GRAPH WHEN THE COLUMNS WERE SEPARATED BY SPACES IN THAT INSTANCE, THE DISTRIBUTIONS WERE DISCONTINUOUS. LOOK AT THE IMAGE AND TRY AGAIN.



49-Comment

The correct response is "center" or "middle." Appropriate corrective feedback would be provided for the incorrect response "mode" or "mean."

Several more short-answer questions follow which review the important objectives, culminating with a description of the terms, "Incomplete Beta Function" and "Normal Curve of Error."

Students have the option to see a frame which contains the mathematical function defining the Normal Curve of Error.

Recall that cumulated percentage of frequencies at center

curve (multiple choice)

of distribution is 50 (completion)

Recognize model as term which best describes normal

Recognize symmetrical quality of model as the characteristic which makes the mean, median, and

50th percentage coincide (multiple choice)

Content Outline

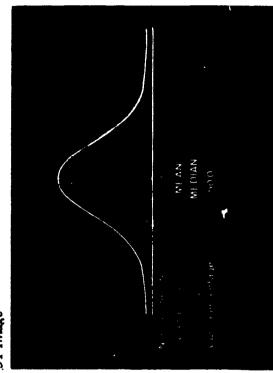
- II. Normal Curve of Error-Application
- A. Normal curve serves as a model for handling and describing behavior variables and characteristics of children.
- B. Center point of normal curve located at:
- 1. Arithmetic mean: sum of values in distribution divided by number of observations
- ". Median: middle value in ordered distribution of values
- 3. These points occur at same center point in normal curve because of its symmetrical quality
- C. If distribution of real data is close fit to normal curve model, relationships and locations attributed to model can be transferred to "real" data.

Student Interactions

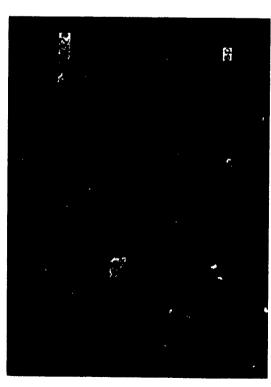
50-Comment

The student is brought to criterion on the first two objectives before proceeding to the next material.

51-Image



S. J. Branch Street



54-CRT



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53-Comment

A light pen response is requested in 54-CRT. The correct response is the fourth option. Other options provide corrective feedback:

Response. First option

Feedback: NO. FREQUENCY CURVES HIGH ON THE ENDS AND LOW IN THE MIDDLE COULD QUALIFY. TRY AGAIN.

Response: Second option

Feedback: FREQUENCY DISTRIBUTIONS
WITHOUT TAILS COULD HAVE THE SAME
CENTER POINT CHARACTERISTICS AS
OUR MODEL, TRY AGAIN

Response: Third option

Feedback: NO. THIS CHARACTERISTIC WOULDN'T AFFECT THE CENTRAL TENDENCY. TRY AGAIN.

55-CRT



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57-CRT

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56-CRT

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Content Outline

- III. Normal Deviate
- A. Standard unit of width or distance on horizontal scale or normal curve model
- B. Measures distances from center point of normal curve model; center of distribution is zero point for normal curve
- 1. values above mean have positive values
- values below mean have negative values
 Distances on normal deviate scale have kind of equal and relative quality; i.e., normal deviate value of +2.0 is twice as far from the mean as normal deviate of +1.0
- D. Six normal deviates (three on each side of the mean) encompass all but .25% of the area under the curve
- E. Normal deviate is termed "standard deviation" when referring to distribution of "live" data.

Behavioral Objectives

- Recognize normal deviate as being an arbitrary but uniform measure (multiple choice)
- Given example, compute size of a normal deviate in score values (short answer)
- Conclude that normal deviates below the mean have negative values, and normal deviates above the mean have positive values (completion)
- Conclude that the area under the curve between -1 and 0• and the area between 0• and +1 are the same (alternate choice response)
- Recognize symmetry as the quality that makes an area under the curve equal to a corresponding area on the other side of the median (multiple choice)

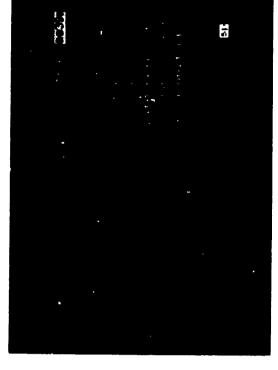
 Conclude that the area between -30- and -10- is not equal to the area between -20- and +20- (alternate choice
- response)
 Given pairs of distances on the baseline of a normal distribution, indicate whether each pair is the same or different in area (alternate choice response)
- Given partially completed table of normal deviate scale points, means, and standard deviations, complete the table with equivalent values
- Find mean values of a distribution of scores (short answer) Given partially completed table of raw scores and normal deviates, complete the table with equivalent values (constructed response)
- Given a distribution with a mean of 30, recognize that 22 and 38 are equidistant from the mean (multiple choice)
- Recognize that the area between -10- and +10- includes about 2/3 of the total distribution (multiple choice) Given spans of normal deviate values, compute the percentages of area corresponding to each span (short answer)

Student Interactions

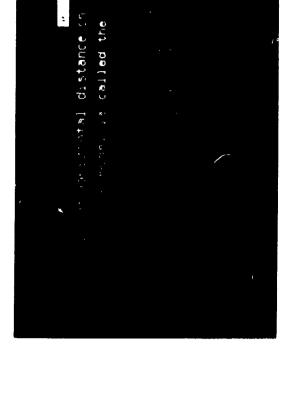
58-Comment

51-Image is still visible to the student on the image projector and is referred to in the following interactions.





61-CRT



7

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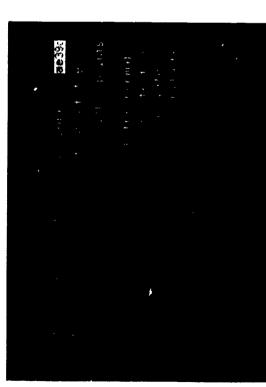
60-Comment

The student responded "distance" to the question in 61-CRT and received corrective feedback. Similar interactions follow.

63-CRT



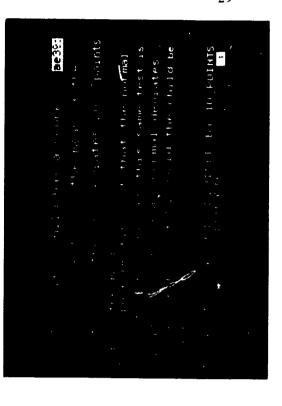
64-CRT



Thus, if a child has a score of 80 on a test, and the mean of the test is 60, then he deviates 20, points above the mean

5.F

65-CRT



ERIC Full Text Provided by ERIC

The zero point for the normal deviate is center of the distribution or the see points we identified as mean, second and 50th percent on the cumulative frequency.

68-Image



4,41.45

<u>:</u>

1

67-CRT

30

The normal deviate is best ae41thought of as

a scale point

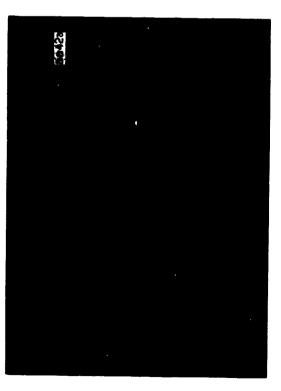
an arbitrary but uniform measure

a variable in a distribution

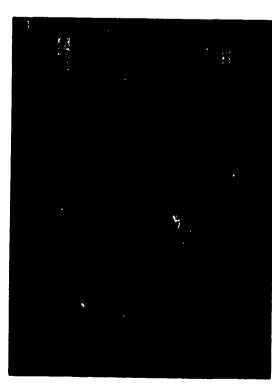
P

69-Comment

70-CRT and 71-CRT illustrate two stages of a 3-part completion question. The student has provided each underscored word to correctly complete the sentences and to demonstrate his competency with the concepts.



72-CRT



The Consession of the Consessi

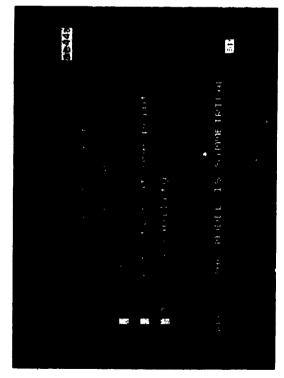
71-CRT

T

in an an an at the post of a sor nor-ad deviate, bely nexts been of the mean In this section we wall identify seas ** / From stant widths have been ments off on the base time of the nor-... and the safe whits as mis. The image and in related and ending to vertical right of have postive walne-THOLES CIGHT

73-Comment

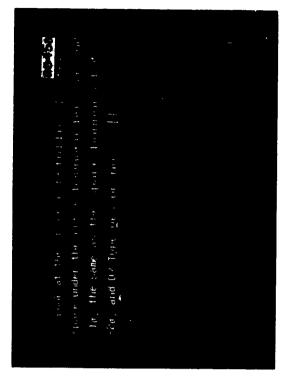
Using the light pen the student selected "same" (72-CRT) and "symmetry" (74-CRT) as his responses and received feedback.



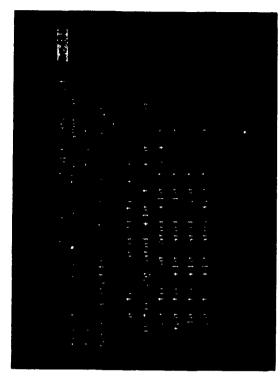
76-Comment

The student has responded correctly to the first four parts of this question (77-CRT). However, he erred on the fifth, as the feedback indicates. The incorrect response was immediately erased and the student was allowed to try again.

75-CRT



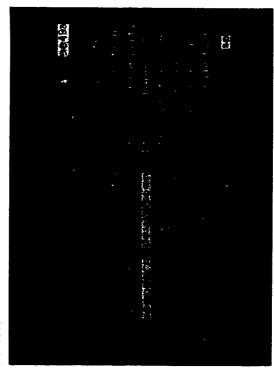
77-CRT



32



80-CRT



79-CRT

One important feature about the ae4normal curve of error is that six normal
deviate units (three on each side of the
mean) encompass approximately 99.75x
(all but one quarter of one percent) of
the area between the curve and the base
line. This feature is often useful in
estimating the amount of variability for
a distribution of "live" data.
Remember: about 6 units cover all of
the observations.

81-CRT

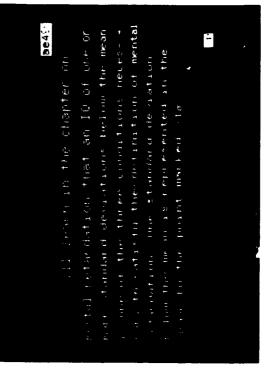


Fig. 1. The state of the state

84-CRT

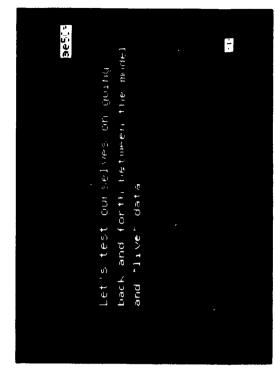
The colonial deviation above aeggeneral of the regeneral considered mores?

The colonial in but cases, about 2 out to the class of the class on the constraint test probably have the colonial colorial colonial colonial colonial colonial colonial colonial colonial colonial colonial c

83-CRT

is contention the core that a setting of the core that a setting of the mean (*80 multiple) of times 15 and subtract from 100, in this case, 20 Fractional parts of the standard deviation are handled in a similar manner.

85-CRT



.....

The second property of the

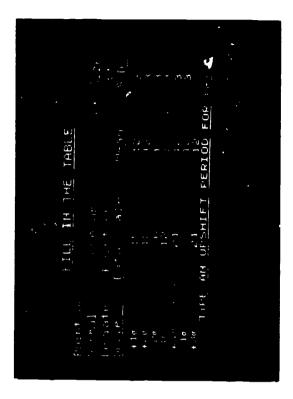
86-Comment

demonstrate his competency with certain concepts of 87-CRT and 88-CRT illustrate two stages of a three part completion question requiring the student to normal deviates.

88-CRT

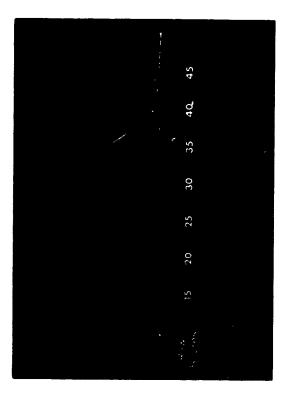


87-CRT

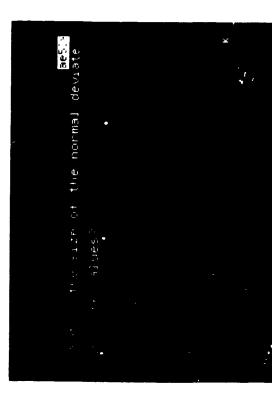


89-Comment

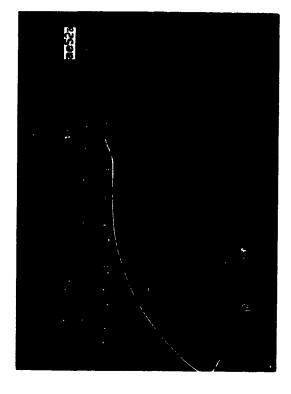
91-CRT through 95-CRT refer the student to 90-Image. Each student response causes the program to provide proper feedback-supportive for correct responses and remedial, corrective feedback for incorrect responses.



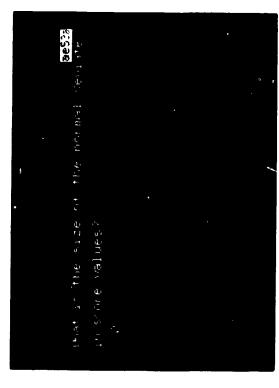
92-CRT



91-CRT

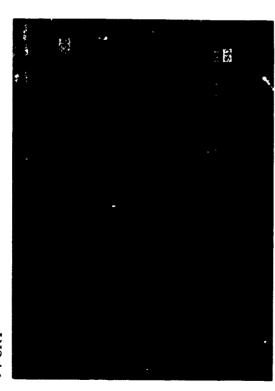


93-CRT



100

94-CRT



96-Comment

The correct response is "28" (95-CRT). Following is an illustration of incorrect responses and the associated feedback for each:

Response: 32

Feedback: NOPE, YOU FORGOT TO PAY ATTENTION TO THE MINUS SIGN.

Response: 26

Feedback: YOU MAY HAVE FORGOTTEN THAT

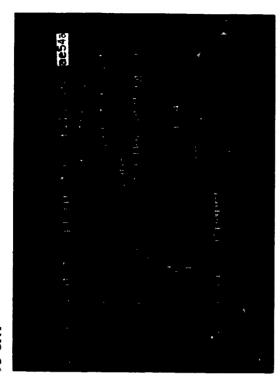
4/10 OF 5 IS ONLY 2, NOT 4. TRY AGAIN.

Response: First unrecognized or unanticipated response

Feedback: HINT: IF 4/10 OF 10 = 4, THEN 4/10 OF5 = 2. Response: Second unrecognized or unanticipated response

Feedback: HINT: IF 4/10 OF 5, THE NORMAL

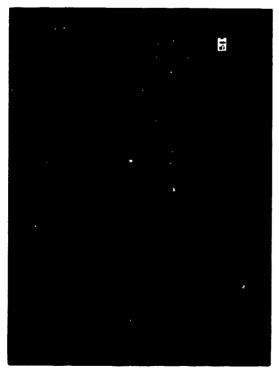
95-CRT

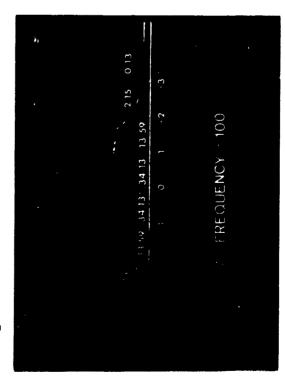


DEVIATE VALUE IS 2 SCORE POINTS, AND IF THE MINUS SIGN SAYS TO SUBTRACT IT FROM THE MEAN, WHAT IS 30 - 2?

Response: Third unrecognized or unanticipated

response Feedback: THE MEAN IS 30 AND 0.40- BELOW THE MEAN IS 2 SCORE POINTS. 30 – 2 = 28. ENTER 28.



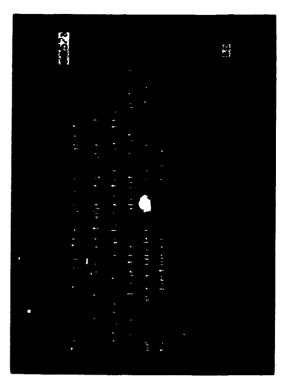


98-Comment

38

100-CRT, 101-CRT, and 103-CRT refer to 99-Image.

100-CRT

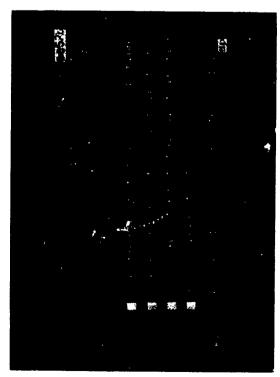


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103-CRT



102-Comment

correctly to the first six problems. Following is an illustration of incorrect responses and the associated 103-CRT shows that the student has responded feedback for the sixth problem:

Response: 100%

Feedback: THE ANSWER COULD NOT BE 100 UNLESS WE INCLUDED ALL SEGMENTS.

Response: 99.94%, 99.84%, 99.64%, 99.24%, or TRY AGAIN. 99.75%

Feedback: YOU'RE VERY CLOSE. BETTER CHECK YOUR ARITHMETIC.

Response: 4.56%

Feedback: YOU'VE INCLUDED SEGMENTS ABOVE +20-AND BELOW -20-AND SUMMED THE FREQUENCIES. TRY AGAIN.

Response: 84.13%

FREQUENCIES EITHER BELOW +20- OR Feedback: NO. YOU ADDED PROPORTIONAL ABOVE -20.

Remedial, tutorial instruction is provided as feedback for unanticipated and unrecognized responses.

Content Outline

IV. Normal Curve Table

- A. Convert areas to percentages by moving the decimal point two places to the right and adding a percent sign.
 - B. Column 2 of the table gives the area from the mean to the normal deviate value.
- C. Column 3 of the table gives the area under the larger portion of the curve either above or below the normal deviate.
- D. Column 4 gives the area under the smaller portion of the curve either above or below the normal deviate.

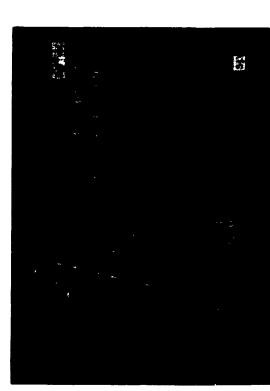
Behavioral Objectives

Given a table of Areas of Normal Curve, be able to interpret the table and use it to convert normal deviates to areas and areas to normal deviates (constructed responses)

Recognize that the areas under the normal curve can be thought of as percentages of the total frequency or area (constructed responses)

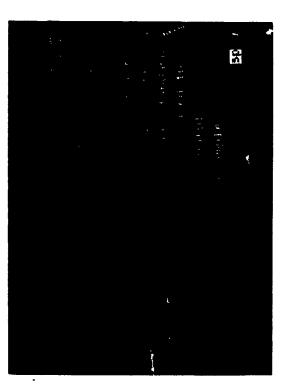
Student Interactions

104-CRT

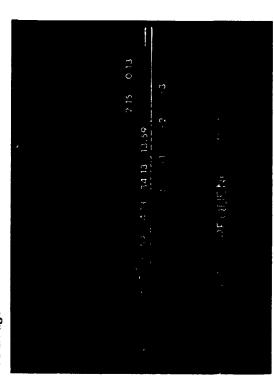


105-Comment

106-CRT refers the student to Plate 7.6 in the student reference handbook which accompanies the course. The table is included in this documentation inside the back cover.



108-Image



The Mary Land William States of the States o

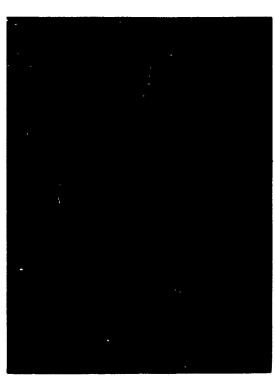
107-Comment

I

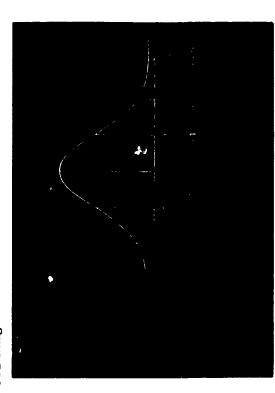
The relationship of tabular and graphic representation of the areas of the normal curve are developed through the coordinated use of the CRT for explanations, image projector for graphic displays, and the table for tabular data.

109-CRT

Suppose you are told that a pebs child scored one standard deviation above the mean on an initelligenic test spective by referring to Plate / P. One standard deviation means 1.00 normal deviate (a) (col 1,p. 116) (col 2 tells you that 34 10% of the people who take the test score between the mean and one standard deviation.



112-Image



111-CRT

3e6 (15.8/%) If the child had scored below general population (theoretically) (of i de la 4 and cotes the theoretical percentage the mean, we would reverse cols 384 the angle as well use cal 3 to find the chald scored hadler than 84 13% of the percentage of the population that he of people who score higher than him surpesseri (n) Sandarates that the Sance the while scored above

113-CRT

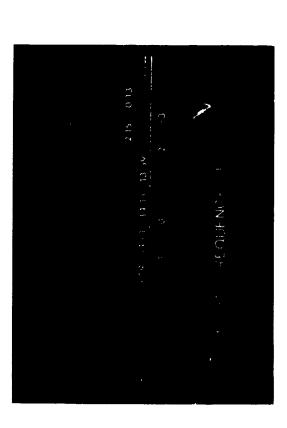
. ૄગુ∌હ The image shows the cumulative percentages for several points on the curve

gaps between the Normal Deviate points In effect, Table \geq 6 fills in the

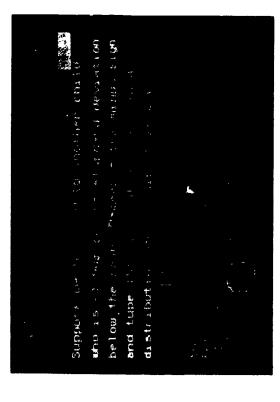
ds

proper in t

I



116-CRT



115-CRT

Suppose we turn now to another child who is -1.00 or one standard deviation below the mean. Remember the minus sign and tupe the per cent of cases in a distribution which this child exceeds.

NO REPREDER THIS IS -1 ODG WHICH LEADS NOW IN USE COLUMN 3 INSTEAD OF COLUMN 4 SEE LIPHGE PROJECTOR

117-CRT

Suppose we turn now to another child who is -1 GOơ or one standard deviation below the mean Remember the minus sign and type the per cent of cases in a distribution which this child exceeds [F]

Measures of Relative Position. >

- Percentiles: divide distributions into 100 equal
- 50th percentile corresponds to normal deviate of 0
- 84th percentile corresponds to normal
- Quartiles: divide distributions into four equal deviate of +1.0 B.
- Deciles: divide distributions into ten equal parts Quintiles: divide distributions into five equal parts ن ن
- Equal and relative quality are not associated with standard deviations

Student Interactions



3670%



1.1

ner coust parts, quartiles

· ** i ratts, deciles into 10

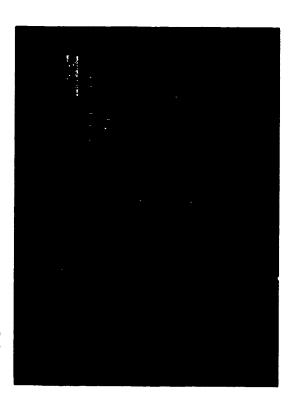
Behavioral Objectives

Conclude that quintiles represent five equal parts (short

Given a partially completed table with percentiles, deciles, and quartiles, complete the table with the appropriate equivalent values (short answer)

Identify 84th PR as the PR corresponding to a normal deviate value of +1 (short answer)

Given percentile ranks, determine the normal deviate values that correspond to each (short answer)



122-Audio

In using percentiles and quartiles to describe the relative position of pupils in some meaningful group, a pupil's score may be said to be at the 75th percentile or at the third quartile. It is incorrect to say that a pupil's score is in the third quartile. Because the quartiles are just score markers or points, a pupil's score cannot be in them. Many people make the mistake of confusing quartiles with quarters. It is, of course, permissible to refer to a given score as being in the third quarter of the distribution, but such a score will be below the third and above the second quartile or median.

121-Comment

A series of exercises (not shown here) require the student to convert percentiles, quartiles, and deciles from one to another. He must convert the following:

3rd quartile to 75th percentile and 7-8th decile 50th percentile to 5th decile and 2nd quartile 1st quartile to 25th percentile and 2nd-3rd decile

123-Comment

124-CRT refers the student to 125-Image for solving the problems. The student responded correctly to the first problem, received feedback and is ready to respond to the second problem (124-CRT).

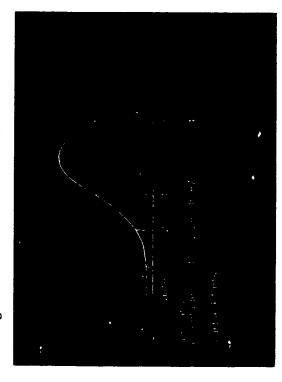
mals. Sells cage and	Percentile					¥	
the deco percent ng table	N.D.	+10	+50	+30			
ear round off the decimals to erest whole percentage and to the following table	we centale	5.0					
		1 1					

126-Comment

127-CRT shows that the student responded correctly with "84.13" and received feedback.



46



127-CRT

Sometimes in comparing scores of Educations in the norm group are interested in certain particular percentile points whe have struct of a normal deviate score of 0 structure to the 50th PR (percentile rank corresponds to 64 11 FR B

128-Audio

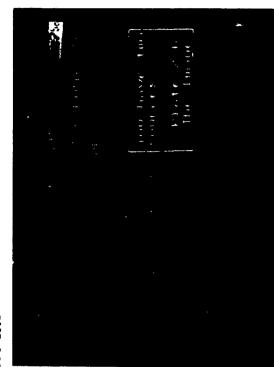
Now we want to learn how to convert percentile in normally distributed data into their corresponding normal deviate values. Notice on the screen that we've chosen percentile rank 10 (that is PR 10) as an example. To find the corresponding normal deviate we the mean. If it is above the mean, our corresponding column of the table to use. Values in Column 3 begin at 50 percent and go up to 100 percent; consequently, they curve. Values in Column 4 begin at 50 percent and go down; consequently, they represent values in the smaller portions of a divided curve. Since 10 is below 50, the value we seek in the table will have a minus sign. And, we can first decide if the 10th percentile rank is above or below deviate will be minus. This decision also tells us which represent frequencies in the larger portion of a divided normal deviate will have a plus sign; if below, the normal locate it by looking for .10 in Column 4. Do this now. ranks (PR)

In Column 4 on Page 4 of the table you will notice entered -1.28 as our answer. Now you can try some table that the value closest to .10 is .1003. Read across to your left in the first column and you will find the normal deviate value of 1.28. We remembered the minus sign and

129-Comment

incorrectly to the first problem, received feedback, and is presented by audio and is required to perform four table look-ups. 132-CRT shows that the student responded asked to try again. If he continues to do poorly on this exercise, he is presented with more problems of the same The student is shown the example (130-CRT) just type before proceeding with the program.

130-CRT



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27

287 DEP YOU FORGET THE PATHUS, STOLEY IN GORTH 1 28 (6,000) (1)

Content Outline

VI. Derived Scores

- A. T-scores
- 1. distribution has a mean of 50 and a standard deviation of 10
- 2. alleviates awkwardness of negative values and decimals associated with normal deviates
- 3. percentile ranks can be converted into T-scores

Student Interactions

133-Audio

In the early days of educational measurement, teachers and other practitioners objected to the use of normal deviate scores for describing pupil test performances. They particularly didn't like the decimals and the necessity for keeping positive and negative signs straight. To overcome this hurdle, Ben Wood proposed a new type of standard score which he called T-scores in honor of two famous educational psychologists, Lewis M. Thurman and Edward L. Thorndike. T-scores are in practical use limited to two digits with a mean of 50 and a normal deviate unit of 10. On the image projector you can see how the T-scores correspond to normal deviate values and also eliminate decimals and negatives.

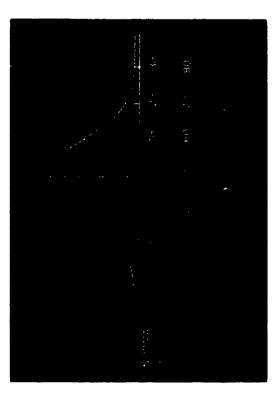
Behavioral Objectives

Given normal deviate values, determine PR equivalent for each (short answer)

Given T-score values, determine PR equivalent for each (short answer)

134-Comment

The student is referred to 135-Image and in 136-CRT is required to convert normal deviate scores to T-scores. He has responded correctly to the first three problems, received feedback each time, and is ready to attempt the fourth problem.



137-Comment

138-CRT refers the student to Plate 7.7 in the student handbook which accompanies the course. The Plate is included in this documentation inside the back cover. 140-CRT requires the student to use the Table to convert T-scores to percentile rank.

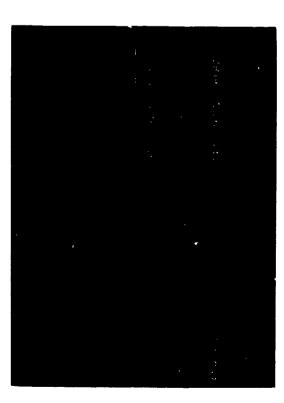
136-CRT

138-CRT

T-wave -

I 39-Image

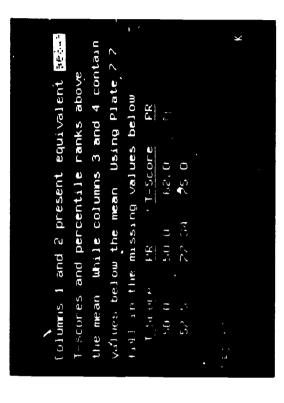
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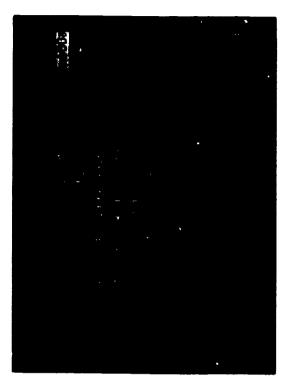
141-Comment

The following materials provide a culminating exercise which causes the student to apply his recently acquired skills in converting normal deviate scores, percentile ranks, and raw scores to a single standard score distribution in order to make appropriate comparisons of the ability measured by a given test for a group of ten children.

140-CRT



142-CRT



	Recor	Records of Ten Pupils on Test A	Pupils on	Test A
*	Hope Bill Susie Ray Don	50 (RS) -1.0 c 105 (RS) 16 (PR) 142 (RS)	Mary Tina Ann Sally Joe	+2.5 \(\text{10 (PR)} \) 80 (RS) +2.0 \(\text{99 (PR)} \)

Test A.: Wean 30 "Normal Deviate = 25 35 = Raw Score PR = Percentile Rank

σ = Normal Deviate

145-Comment

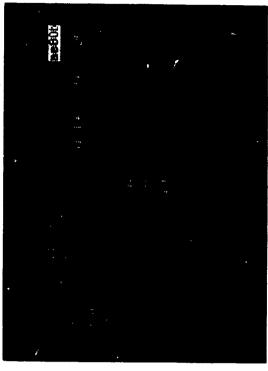
The student responded (146-CRT), received feedback, and is required to respond again. 146-CRT through 150-CRT show the student's attempts to solve the problems.

144-CRT

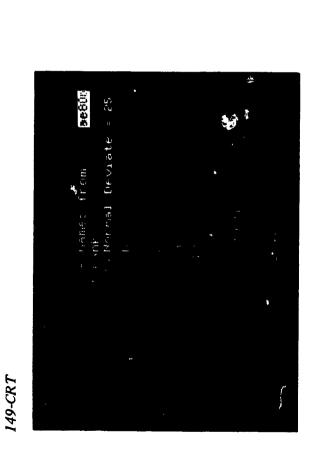
The raw mean for the normalise aeong group is 80 and the normal deviate is 25 raw score powers.

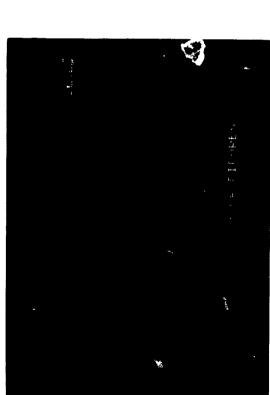
On the next frame you will rank the children from highest to lowest in terms of the ability measured by TESTA Use scratch paper and the tables in your CAREL Handbook (Plate 2 G)

146-CRT



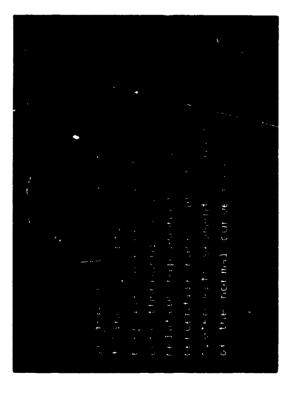
150-CRT











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PLATE 7.6
18 of Normal Curve

Am Already (

Address spanned

			Areas of Normal Curve	rmal Curve			
(1) Normal	(2) Area From	(3) Area in	(4) Area In	(1) Normal	(2) Area From	(3) Ares in	(4) Area In
Deviate (o)	Mean to o'	Larger Portion	Smaller Portion	Deviate (0)	Mean to or	Larger Portion	Smaller Portion
0.00	0000	.5000	2000	040	1554	.1554	.3446
0.01	.0040	5040	0967	0.41	1651.	.6591	.3409
0.05	0800	.5080	.4920	0.42	.1628	.6628	.3372
0.03	.0120	.5120	4880	0.43	.1664	.6664	.3336
.0.0 4	.0160	.5160	.4840	4.0	.1700	.6700	.3300
0.05	.0199	5199	.4801	0.45	.1736	92/9	3264
0.0	.0239	.5239	.4761	0.46	.1772	.6772	.3228
0.0	.0279	5279	.4721	0.47	.1808	8089	.3192
80.0	.0319	.5319	.4681	0.48	.1844	.6844	.3156
60.0	.0359	.5359	.4641	0.49	.1879	6899	.3121
910	308	\$ 308	4602	9	101	3109	3085
0.11	0438	5438	4562	0.51	1950	6369	3050
0.12	.0478	.5478	.4522	0.52	.1985	6985	3015
0.13	.0517	5517	.4483	0.53	2019	.7019	2981
0.14	.0557	.5557	.4443	0.54	2054	.7054	.2946
31.0	7080	7033	7077	99	3000	9000	2012
91.0	9650.	9636 3636	7987	0.55	2123	7173	77.67
0.17	.0675	5675	4325	0.57	2157	7157	2843
0.18	.0714	5714	.4286	0.58	.2190	.7190	2810
0.19	.0753	.5753	.4247	0.59	2224	.7224	2776
							(
0.20	.0793	.5793	4207	09:0	72257	7257	2743
0.22	.0832	5871	4129	0.62	2324	7324	2676
0.23	.0910	.5910	4090	0.63	2357	7357	2643
0.24	.0948	.5948	.4052	79.0	.2389	.7389	2611
30.0	7000	6087	4013	940	7477	7477	3678
970 0	10.5	7967 7009	3974	59.0	2454	77454	2546
0.27	1901	4909	.3936	0.07	2486	7486	2514
0.28	.1103	.6103	.3897	89.0	2517	.7517	2483
0.29	.1141	.6141	.3859	69:0	2549	.7549	2451
0.30	1179	6179	.3821	0.70	2580	7580	2420
0.31	.1217	.6217	.3783	0.71	2611	.7611	2389
0.32	.1255	.6255	.3745	0.72	.2642	.7642	2358
0.33	.1293	.6293	.3707	0.73	2673	.7673	2327
0.34	.1331	.6331	.3669	0.74	.2704	.7704	2296
0.35	.1368	.6368	.3632	0.75	.2734	AE11.	2266
0.36	.1406	.6406	.3594	92.0	2764	1764	2236
0.37	.143	.6443	.3557	0.77	2794	7794	2206
0.38	.1517	08480	.3520	0.78	.2823	7823	2177
0.39	.1517	.6517	.3483	67:0	7827	7827	7148

PLATE 7.6 Areas of Normal Curve

2939	(1) Normal Deviate (9)	(2) Ares From Mean to cr	(3) Area In	(4) Area In Smaller Beating	(I) Normal	(2) Area From	(3) Area In	(4) Area In
2881 .7881 2119 2936 .7957 .7060 2936 .7959 .2066 2937 .7967 .2033 2937 .7967 .2033 3023 .8023 .1977 3078 .8078 .1977 3078 .8078 .1977 3106 .8133 .1949 3186 .8186 .1867 3186 .8186 .1867 3212 .8186 .1867 3218 .8186 .1867 3218 .8186 .1867 3218 .8186 .1762 3218 .8186 .1788 3228 .8289 .1661 3340 .8340 .1660 3340 .8441 .1562 3448 .8441 .1587 3448 .8441 .1562 3448 .8441 .1539 3446 .8485 .1646 3574 .8534 .1446 3574 .8534 .1446 3579 .866 .8663 .1314 3709 .8749 .1231 3700 .8770 .1231 3700 .8770<			morn or morn	Sugared Forum	Leviste (0)	Mean to O	Larger Portion	Smaller Portion
2910 7910 2090 2957 7995 2095 2957 7967 2035 2957 7967 2035 3073 8073 1977 3073 8073 1977 3073 8051 1949 3073 8051 1949 3078 8051 1949 3136 8159 1184 3137 8139 1844 3212 8186 1736 3236 8228 1736 3340 8289 1711 3343 8413 1660 3340 8389 1611 343 8483 1650 343 8483 1650 3485 8483 1650 3485 8483 1650 354 8538 1640 3554 8534 1446 3554 8534 1446 3554 8539 1441 366 8665 1335 367 8665 1335 368 8665 1336 370 870 1230 3729 870 1230 3720 870 12	0.80	.2881	.7881	2119	1.20	3849	8840	1311
2939 7939 2061 2967 7967 2063 295 7967 2065 3073 8053 1977 3078 8053 1977 3078 8078 1942 3106 8106 11949 3136 8136 1184 3137 8136 1184 3212 8186 1184 3212 8238 1762 3240 8264 176 3340 8264 176 3340 8264 176 3340 8348 1635 3340 8348 165 3438 8443 1635 3448 8448 1535 348 8448 1535 348 8448 1535 3531 853 1446 3531 853 1446 3537 853 1446 3539 8665 1335 3643 8665 1335 3644 8779 1379 3749 8770 1271 3749 8770 1230 3749 8770 1230 3790 8790 1	0.81	2910	.7910	7090	1.21	3869	0,000	1211
2967 7967 2033 3023 8023 1977 3078 8023 1977 3078 8078 1977 3078 8078 1977 3078 8078 1974 3078 8078 1974 3113 8106 1867 3186 8186 1884 3212 8186 1844 3213 8289 1788 3243 8264 1736 3345 8315 1653 3346 8389 1611 3438 8438 1650 3439 8389 1611 3430 8438 1650 3438 8438 1611 3508 8438 1611 3534 8508 1446 3577 8577 1446 3577 8577 1446 3577 8664 1336 366 8665 1336 3749 8779 1336 3749 8770 1230 3740 8770 1230 3749 8770 1231 3770 8770 1230 3810 8866	0.82	2939	.7939	.2061	1.22	3888	800	2111
3023 7995 3021 8023 3031 8051 3031 8053 3031 8053 3031 8078 3106 8166 3186 816 3186 8186 3186 8186 3186 8186 3238 8186 3238 8238 3240 8248 3340 8340 3341 8413 343 8438 3446 8486 3485 8486 3554 8486 3554 8486 3554 8486 3556 8486 3577 1446 3577 1446 3577 1446 3577 1446 3577 1446 3577 1446 3577 1446 3577 1446 3577 8539 3665 8665 3664 1335 3665 8665 3779 1379 3779 8770 3770 8770 3770 8790 3770 8790	0.83	2967	7967.	2033	1.23	3907	8907	1001
3023 8023 1977 1949 3078 3078 1949 3078 31078 1949 31078	*	.2995	.7995	.2005	1.24	.3925	8925	.1075
3051 3051 1949 3078 8078 1922 3106 8106 1894 3186 8186 1884 3212 8212 1788 322 822 8228 1788 3240 8238 1736 3340 8349 1736 348 848 1560 348 848 1552 348 848 1552 354 848 1552 354 8534 1492 354 8554 1402 357 8653 1335 3665 8665 1335 370 870 1230 371 871 872 371 871 1230 372 872 1230 373 873 1230 374 876 1230 377 877 1230 378 878 378 870 1230 379 870 1230 370 870 1230 3810 8810 3810 1230 3810 8810 3810 8810 3810 8810 3810 8810 3810 8810 3810 8810 3810 4810 3810	0.85	.3023		1977	36.	7000	7700	,
3078 8078 1922 3133 8159 1841 3166 8159 1841 3186 8186 1844 3212 8186 1844 3228 8238 1762 3240 8238 1711 3345 8349 1685 3346 8349 1685 3349 8389 1611 3485 8485 1611 3486 8485 1612 3487 8485 1446 3534 8859 1446 3534 8853 1446 3534 8853 1446 3536 8531 1469 3537 8653 1446 3577 8653 1446 3564 8665 1339 3643 8665 1339 3709 8709 1231 3700 8709 1230 3700 8700 1230 3700 870 1230 3700 870 1230 3700 870 1230 3700 870 1230 3700 870 1210 3700 870 <t< td=""><td>0.86</td><td>.3051</td><td>8051</td><td>0761</td><td>1.75</td><td># KG</td><td>4408</td><td>1056</td></t<>	0.86	.3051	8051	0761	1.75	# KG	4408	1056
3106 3106	0.87	.3078	8078	1001	971	7966	.8962	.1038
3133 8133 1867 1867 1878 1878 1879 1841 1878 1879 1841 1878	0.88	3106	8106	7761	77.1	3980	0868	.1020
.3155 .8159 .1841 .3186 .8186 .1844 .3238 .8238 .1762 .3289 .8238 .1711 .3315 .83315 .1685 .3340 .8340 .1685 .3345 .8349 .1611 .336 .8389 .1611 .343 .8443 .1562 .348 .848 .1539 .348 .848 .1539 .348 .848 .152 .350 .848 .152 .357 .858 .1492 .357 .8554 .1446 .357 .8554 .1446 .357 .8559 .1440 .357 .8589 .1446 .357 .8589 .1446 .359 .8664 .1433 .3665 .8664 .1336 .370 .8729 .1271 .3749 .8770 .1230 .3740 .8770 .1230 .3740 .8749 .1230	0.89	.3133	.8133	1867	1.28	.3997	.8997	.1003
.3155 .8159 .1841 .3218 .8186 .1841 .3236 .8186 .1841 .3236 .8236 .1762 .3346 .8349 .1711 .3340 .8349 .1613 .343 .843 .1650 .343 .843 .1613 .3443 .8461 .1587 .3485 .8486 .1613 .3486 .8586 .1446 .3577 .8534 .1446 .3577 .8559 .1401 .3643 .8664 .1423 .3643 .8664 .1335 .3643 .8664 .1335 .3643 .8664 .1335 .3729 .8729 .1271 .3729 .8729 .1210 .3740 .8739 .1230 .3740 .8770 .1230 .3729 .8739 .1230 .3740 .8770 .1230 .3740 .8770 .1210 .3750 .8730 .1210 .3740 .8749 .1210 .3750 .8730 .1210 .3740 .8749 .1210 .3750 <t< td=""><td></td><td></td><td></td><td></td><td></td><td>CIOF.</td><td>CIUC.</td><td>2867</td></t<>						CIO F.	CIUC.	2867
3186 8186 .1814 3212 .1788 .1788 3238 .8231 .1736 .3239 .8289 .1711 .3340 .8340 .1660 .3365 .8340 .1613 .3438 .8436 .1613 .3438 .8443 .1587 .3438 .8443 .1587 .3485 .3485 .1513 .3485 .3486 .1540 .3534 .8485 .1542 .3534 .8485 .1542 .3536 .8586 .1492 .3537 .8554 .1446 .3554 .8554 .1446 .3554 .8554 .1446 .3577 .8554 .1446 .3577 .8586 .8663 .3663 .8663 .1379 .3708 .8708 .1230 .3770 .8770 .1230 .3770 .8790 .1210 .3790 .8790 .1210 .3790 .3790 .3790 <td>0.90</td> <td>.3159</td> <td>.8159</td> <td>.1841</td> <td>1.30</td> <td>4032</td> <td>9033</td> <td>9900</td>	0.90	.3159	.8159	.1841	1.30	4032	9033	9900
3212 8212 1788 3264 8238 1762 3264 8238 1762 3315 8315 1685 3340 8340 1660 3365 8389 1611 3413 8413 1635 3485 8485 1611 3486 8485 1539 3508 8508 1492 3531 8531 1469 3534 8534 1446 3536 8534 1446 3574 8554 1446 3579 8653 1401 3643 8663 1379 3643 8664 1335 3666 8666 1336 3709 8779 1231 3770 8770 1230 3770 8770 1230 3810 8770 1120 3790 8770 1230 3770 8770 1230 3770 8770 1230 3770 8770 1230 3770 8770 1230	0.91	.3186	.8186	.1814	1.31	4049	9040	.0360 1360
.324 .8238 .1762 .3264 .8264 .1762 .3289 .8289 .1711 .3340 .8340 .1660 .336 .8365 .1613 .3413 .8413 .1685 .348 .8438 .1611 .348 .8443 .1587 .348 .8485 .1515 .3531 .8538 .1492 .3534 .8554 .1446 .3534 .8554 .1446 .3534 .8554 .1446 .3536 .8654 .1401 .3547 .8579 .1401 .3565 .8643 .1379 .3643 .8665 .1314 .3749 .8729 .1271 .3749 .8749 .1230 .3749 .8749 .1230 .3740 .8770 .1230 .3810 .8810 .1210 .3810 .1210	0.92	.3212	.8212	.1788	1.32	4066	9906	1660
3289 3284 3315 3315 3340 3346 3340 3346 3340 3346 3340 3346 3340 3346 3340 3346 3340 3346 3340 3348 3438 3483 3485 3483 3485 3483 3485 3484 3485 3486 3531 3853 3532 3853 3534 3853 3537 3854 3537 3854 3537 3857 3643 355 3643 335 3643 335 3643 335 3643 335 3643 335 3646 336 3709 3709 3729 3770 3770 3770 3810 3770 3810 3130 3810 3130 3810 3130 3810 3130	0.93	.3238	.8238	.1762	1.33	.4082	9082	8160
3315 8289 1711 3340 8340 1685 3340 8340 1660 3365 8365 1635 3389 8389 1611 3413 8413 1587 3461 8461 1539 3461 8485 1515 3485 8508 1492 3531 8531 1492 3534 8554 1446 3577 8554 1401 3577 8577 1401 3577 8529 1379 3643 8643 1379 3643 8665 1335 3665 8665 1336 3708 8709 1271 3749 8779 1230 3770 8770 1230 3810 8810 11290 3790 8790 11210	\$.3264	.8264	.1736	1.34	4099	6606	.090
.3315 .8315 .1685 .3340 .8340 .1660 .3365 .8340 .1635 .3366 .8365 .1611 .3413 .8413 .1587 .3461 .8461 .1539 .3462 .8485 .1515 .3485 .8508 .1492 .3534 .8554 .1466 .3577 .8554 .1466 .3577 .8557 .1401 .3599 .8589 .1401 .3643 .8665 .1335 .3665 .8665 .1336 .3708 .8729 .1271 .3749 .8779 .1230 .3790 .8770 .1230 .3790 .8770 .1230 .3790 .8770 .1230 .3790 .8770 .1230 .3790 .8770 .1230 .3790 .3790 .1210 .3810 .1210	0.95	.3289	8289	1711	1 35	7117		4
.3340 .8340 .1660 .3365 .8365 .1635 .3413 .8413 .1587 .3438 .8438 .1562 .3461 .8461 .1539 .3485 .8485 .1492 .3485 .8508 .1492 .3534 .8534 .1466 .3537 .8554 .1446 .3539 .8559 .1401 .3599 .8599 .1401 .3643 .86643 .1379 .3643 .86643 .1379 .3708 .8708 .1292 .3749 .8729 .1271 .3749 .8770 .1230 .3750 .8770 .1230 .3750 .8790 .1210 .3750 .8790 .1210 .3750 .8790 .1210 .3750 .8790 .1210 .3750 .8790 .1210 .3750 .8790 .1210 .3790 .8790 .1210 .3790 .3790 .37	96.0	.3315	8315	2891	1.33	.4115 4121	5115	2880.
.3465 .84565 .1635 .3413 .8413 .1587 .3436 .8438 .1562 .3461 .8438 .1562 .3462 .8485 .1515 .3485 .8485 .1515 .3508 .8538 .1469 .3531 .8531 .1469 .3554 .8554 .1446 .3579 .8599 .1401 .3599 .8663 .1401 .3663 .8664 .1379 .36643 .879 .1231 .3708 .878 .1251 .3749 .8770 .1230 .3790 .8770 .1230 .3790 .8770 .1230 .3790 .8770 .1230 .3790 .8770 .1230 .3810 .8790 .1210 .3810 .8790 .1210 .3810 .1190	0.97	.3340	.8340	1660	1 37	7717	1516.	.0869 6290
.3389 .8389 .8413 .1587 .3438 .8438 .1562 .3461 .8461 .1539 .3485 .8486 .1539 .3485 .8486 .1492 .3531 .8531 .1469 .3554 .8554 .1446 .3577 .8577 .1423 .3599 .8621 .1401 .3665 .8665 .1379 .3665 .8666 .1314 .3729 .8708 .1251 .3749 .8770 .1271 .3790 .8770 .1210 .3790 .8770 .1210 .3790 .8770 .1210 .3790 .8770 .1210 .3790 .8770 .1210 .3790 .8790 .1210 .3790 .8790 .1210 .3790 .8790 .1210 .3790 .8790 .1210 .3790 .8790 .1210 .3790 .3790 .1210 .3790 .3790	96.0	.3365	.8365	.1635	1.38	(A16)	9163	2003
.3413 .8413 .1587 .3436 .8438 .1562 .3461 .8461 .1539 .3485 .8485 .1515 .3485 .8508 .1492 .3531 .8531 .1469 .3534 .8534 .1446 .3577 .8577 .1446 .3599 .3621 .1379 .3643 .8652 .1379 .3643 .8665 .1379 .3665 .8666 .1314 .3729 .8729 .1271 .3749 .8770 .1251 .3790 .8770 .1210 .3790 .8770 .1210 .3790 .8770 .1210 .3810 .1190 .1190	0.99	.3389	.8389	.1611	1.39	.4177	.9177	0823
3436 8438 1200 3461 8461 1539 3485 8485 1515 3485 8485 1492 3508 8538 1446 3531 8531 1446 3554 8554 1446 3577 8559 1401 3621 8621 1379 3643 8643 1379 3643 866 1314 3729 8729 1271 3729 8729 1251 3730 8770 1251 3810 1230 1210 3810 1190 1190	1.00	2413	8413		•	•	,	
3461 .8461 1.539 .3485 .8486 1.539 .3485 .8508 1.492 .3531 .8534 1.446 .3554 .8554 1.446 .3577 .8554 1.446 .3577 .8559 1.401 .3621 .8621 1.379 .3623 .8643 1.379 .3665 .866 1.314 .3729 .8739 1.271 .3729 .8779 1.251 .3730 .8770 .1210 .3730 .8770 .1210 .3810 .1210 .1210	1.01	3438	8438	1961.	₽. ·	.4192	.9192	0808
3485 3485 1515 3508 8508 1492 3531 8531 1469 3554 8554 1466 3577 8537 1446 3579 8599 1401 3621 8621 1379 3643 8643 1379 3645 866 1314 366 866 1314 3729 8729 1271 3729 8770 1251 3730 8770 1230 3810 1190	1.02	3461	8461	1530	14:1	, 420 1933	.9207	0793
3508 8508 1492 3531 8531 1469 3554 8554 1446 3577 8577 1423 3599 8599 1401 3621 8643 1379 3665 8665 1335 3665 8666 1314 3708 8708 1292 3749 8770 1230 3770 8770 1230 3770 8770 1230	1.03	3485	8485	1515	1.42	7775	.9222	0778
3531 8531 1469 3554 .8554 .1446 3577 .8577 .1446 3529 .8599 .1401 3621 .8621 .1379 3643 .8643 .1357 3665 .8666 .1335 366 .866 .1314 3729 .8729 .1251 3749 .8770 .1210 3810 .8770 .1190	1 .0	.3508	.8508	.1492	144	4251	9226 1350	10764 0740
.3531 .8531 .1469 .3554 .8554 .1446 .3577 .8577 .1445 .3599 .8599 .1401 .3621 .8643 .1379 .3643 .8665 .1335 .3665 .8666 .1314 .3708 .8708 .1251 .3749 .8779 .1251 .3770 .8770 .1210 .3730 .8770 .1210						1071	1676	A+/ C
. 3554	1.05	.3531	.8531	.1469	1.45	.4265	9265	0735
	3 5	.3554	.8554	.1446	1.46	.4279	9279	0721
.3529 .8529 .1401 .3643 .8643 .1379 .3665 .8666 .1314 .3708 .8708 .1251 .3749 .8770 .8770 .1251 .3750 .8770 .1251 .3750 .8770 .1251 .3750 .8770 .1251) 6	1705.	.8577	.1423	1.47	.4292	.9292	0708
.3643 .8643 .1357 .3665 .8665 .1357 .3665 .8665 .1314 .3708 .8729 .1271 .3749 .8779 .1271 .3770 .8770 .1230 .3790 .8790 .1210 .3810 .1190	8 8	2600	28.28.	10401	1.48	.4306	.9306	7690
3643 .8643 .1357 .3665 .8665 .1335 .3686 .866 .1314 .3708 .8708 .1292 .3749 .8749 .1251 .3770 .8770 .8790 .1210 .3810 .8790 .1190	1.03	1700	.8621	.1379	1.49	.4319	.9319	0681
3665 .8665 .1335 .3686 .8686 .1314 .3708 .8708 .1271 .3749 .8749 .1251 .3770 .8770 .8790 .1210 .3810 .8790 .1190	1.10	.3643	.8643	.1357	1.50	4330	0333	8770
.3686 .1314 .3708 .8708 .1292 .3729 .8749 .1251 .3749 .8770 .1250 .3790 .8790 .1210 .3790 .8790 .1210	1:11	.3665	.8665	.1335	1.51	4345	9345	9990r
.3729 .8729 .1251 .3749 .8749 .1251 .3770 .8770 .1250 .3790 .8790 .1210	1.12	.3686	8686	.1314	1.52	4357	9257	0643
.3749 .8749 .1251 .3770 .8770 .1230 .3770 .8770 .1230 .3790 .8790 .1210	1113	3770	870x	.1292	1.53	.4370	.9370	0630
.3749 .8749 .1251 .3770 .8770 .1230 .3790 .8790 .1210 .3810 .8810 .1190		6716.	67/9:	.1271	1.54	.4382	.9382	.0618
.3770 .8770 .1230 .3790 .8790 .1210 .3810 .8810 .1190	1.15	.3749	.8749	.1251	1.55	4394	761.6	טעטע
. 3790	1.16	.3770	.8770	.1230	1.56	4406	9406	7650
3810 .8810 .1190	1.17	.3790	.8790	.1210	1.57	418	9418	6850
30.00	1.18	.3810	.8810	.1190	& S	4420	0470	7000
0.1170	1.19	.3830	8830	.1170	1.59	1	1776	1/50

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PLATE 7.6
Areas of Normal Curve

(1) Normal	(2) Arts From	(3) Ares la	(4) Area In	(1) Normal	(2) Area From	(3) Area In	(4) Aces In
Deviate (Ø)	Mean to or	Larger Portion	Smaller Portion	Deviate (0)	Mean to o	Larger Portion	Smaller Portion
3	4918	.9918	.0082	2 80	474	9974	.0026
2.41	.4920	0266:	0800.	2.81	.4975	3975	.0025
2.42	.4922	.9922	8,000	2.82	.4976	9976	.0024
43	.4925	.9923	.0075	2.83	.4977	.9977	.0023
3	.4927	.9927	.0073	2 84	.4977	.9977	.0023
45	.4929	.9929	.0071	2.85	A978	9978	.0022
9	.4931	.9931	6900:	2.86	4979	9979	.0021
2.47	.4932	.9932	8900.	2.87	.4979	9796	.0021
~	.4934	.9934	9900.	2.88	.4980	0866	0030
S	.4936	9936	.00 6 4	2.89	.4981	.9981	.0019
. 05	.4938	9938	00062	2.90	4981	9981	9100
2 5	940	0400	0900	200	4987	2000	8100
22	1964	1466	6900	2.92	4982	9982	0018
53	4943	6706	00057	2 93	4983	2000	0017
2.54	.4945	2948.	.0055	2.94	4984	9984	.0016
33	4046	900	7500	300	7007	7300	3100
3	4049	200	200	20.7	4004	3000	2100
35	6767	90	2000	6.4 0.00	4086	2986	2100
88	4951	1886	0049	2.08	4986	9886	4100
2.59	.4952	.9952	.0048	2.99	.4986	9866	.0014
5	4063	0000	7700	6	7007	6	
26.6	4955	2523	2000	9.00	.430/	.996/	. 100.
3 2	7907	7300	200				
3 5	77.47	9067	0043				
2.64	4959	9989	.0041				
	;	;					
S	4960	966:	0040				
9	.4961	.9961	.0039				
2.67	.4962	3962	.0038				
8	.4963	.9963	.0037				
8	4964	396 6	.0036				
2	4965	\$766	0035				
	4766	9000	25				
: 2	4967	1966	0033				
73	4968	8966	200				
2.74	4969	6066	.0031				
×	4070	000	0000				
2.76	4971	1266	9039				
7.2	4972	9972	0028				
. 20	4973	973	0027				
0	4074	400	9000				

THE COLUMN IS NOT THE TOTAL TO

PLATE 7.6 Areas of Normal Curve

(1) Normal Deviate (9) 1.60 1.61 1.63 1.64 1.65	(2) Area From Mean to o	(3) Area In	Area In	(1) Normal	(2) Area From	(3) Area In	(4)
1.60 1.61 1.63 1.64 1.68		Larger Portion	Submer rotuon	Deviate (9)	Mean to of	Larger Portion	Smaller Portion
3.1.1.6.2.2.2.3.1.1.2.2.2.2.2.2.2.2.2.2.2.2.2.2	4467	9467	0548	00 0	4777	0777	0000
1.62 1.63 1.64 1.65 1.65 1.65	1 463	2000	25.50	200	4778	2116.	
55. 56. 3. 56. 36. 36. 36. 36. 36. 36. 36. 36. 36. 3	7/77	7476	7650	101	4783	0,70	1110
2. 2. 3.1. 3.1. 3.1. 3.1.	7877	7870	9150	10:1	4788	2010	0217
1.65 1.66	.4495	.9495	.050	2.04	.4793	9793	.0207
1.68 1.68	***	****		•			
P.00	.450s	5565	2650	2.05	4798	9798	.0202
	2010	.9515	.0483	2.06	. 4803 6004	.9803 9000	7610.
/0°7	C7 C4.	3272	2475	2.07	8084.	8086.	2010.
1.69	4545	9545	25.50	2.08	4817	9812	0.0 8810.
				60:7	101	106:	C910:
1.70	.4554	.9554	.0446	2.10	.4821	.9821	.0179
1.71	.4564	9564	.0436	2.11	.4826	.9826	.0174
1.72	.4573	.9573	.0427	2.12	.4830	.9830	.0170
1.73	.4582	.9582	.0418	2.13	.4834	9834	.0166
1.74	.4591	.9591	.0409	2.14	.4838	.9838	.0162
1.75	4599	9599	1040	2.15	7847	0847	0158
1.76	4608	8(96)	0392	21.2 A1.0	4846	. 9846 846	0010. 1054
1.77	.4616	.9616	.0384	2.17	4850	9850	0120
1.78	.4625	.9625	.0375	2.18	4854	9854	0146
1.79	.4633	.9633	.0367	2.19	.4857	.9857	.0143
8 -	4641	0641	0360	c c	797	7,000	6
8 -	4649	0640	, co. co.	07:7	1984.	1986.	9210.
1.82	4656	9656	0344	177	.4004 4868	\$006.	0130
1.83	7997	7996	0336		4871	.780	9610
1.84	.4671	. 1796.	.0329	2.24	.4875	.9875	.0215
;							
1.85 1.85	.4678 4686	.9678	.0322	2.25	.4878	.9878	.0122
1.87	663	2000	2030	97.7	1007	1996	9110
1.88	4699	696	1030	17:7 0 C	4887	\$00.5 1000.5	0110
1.89	.4706	9026	.0294	2.29	4890	986.	0110
8	4713	0713	2000	ć	7	6	6
191	4719	9719	.028/	2.30	489.5	. 989.5 . 989.5	010.
1.92	.4726	9726	.0274	2.32	868	8686	.0102
193	.4732	.9732	.0268	2.33	4901	9901	6600
1.94	.4738	.9738	.0262	2.34	4064.	4 066:	9600
1.95	47.44	9744	0.2 S.K	7.36	4004	3000	7007
1.96	.4750	.9750	.0250	2.35	4909	9066	1600
1.97	.4756	9756	.0244	2.37	4911	1166	6800
1.98	.4761	.9761	.0239	2.38	.4913	.9913	.0087
1.99	.4767	.9767	.0233	2.39	.4916	9166	1084

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PLATE 7.7

Area T-Scores in Terms of Percentile Ranks

T.Scaret Above Mean Telogram Telogram Above Mean Telogram Above Mean Telogram Above Mean Telogram Telogram Above Mean Telogram Above Mean Telogram Telogram Above Mean Telogram Telogra		PERCENTILE RANK				PERCENTILE RANK	ILE RANK	
50.00 50.00 50.00 67.5 95.99 4.01 51.99 46.01 49.5 66.0 96.41 3.59 51.99 46.02 49.5 66.0 96.41 3.29 51.99 46.02 49.5 66.0 96.41 3.28 51.99 46.02 44.3 70.0 97.74 2.67 61.79 38.21 47.0 70.0 97.74 2.67 63.68 36.32 47.0 70.0 97.74 2.67 65.54 36.32 46.0 71.0 99.20 2.28 65.54 36.32 46.0 71.5 98.21 11.9 65.54 36.32 46.0 71.5 98.21 11.9 66.13 36.32 46.0 71.5 98.21 11.9 66.14 36.0 46.0 71.5 99.20 0.71 77.24 27.43 44.3 74.5 99.36 0.72 77.24 <t< th=""><th>T-Score</th><th>Above Mean</th><th>Below Mean</th><th>T-Score</th><th>T-Score</th><th>Above Mean</th><th>Below Mean</th><th>T-Score</th></t<>	T-Score	Above Mean	Below Mean	T-Score	T-Score	Above Mean	Below Mean	T-Score
53.99 46.01 49.3 68.0 95.41 3.59 55.96 46.02 49.0 68.0 95.4 3.29 55.96 46.04 48.3 68.0 95.4 3.29 55.96 42.07 48.0 68.0 97.13 2.86 55.98 40.13 47.3 70.0 97.72 2.87 65.78 36.21 46.0 70.2 98.21 1.79 65.74 36.44 46.5 71.0 98.21 1.79 65.34 46.6 46.5 71.2 98.21 1.79 65.34 46.5 71.2 98.21 1.79 70.88 29.12 44.0 71.2 98.21 1.73 70.89 47.2 74.5 99.29 1.17 70.80 47.5 74.5 99.29 1.17 70.80 47.5 74.5 99.29 1.17 70.80 47.5 76.5 99.29 0.71 <t< td=""><td>\$0.0</td><td>80.00</td><td>\$0.00</td><td>50.0</td><td>67.5</td><td>66.56</td><td>4.01</td><td>32.5</td></t<>	\$0.0	80.00	\$0.00	50.0	67.5	66.56	4.01	32.5
53.98 46.62 49.0 68.5 96.78 37.2 55.96 44.04 48.0 68.5 97.13 2.87 57.93 42.07 48.3 69.6 97.13 2.87 51.79 34.13 47.5 70.0 97.12 2.58 66.17 36.21 47.0 70.3 97.12 2.58 66.18 36.22 44.5 70.0 97.12 2.58 66.18 36.24 44.5 71.0 99.2 11.19 66.18 26.46 44.5 77.0 99.2 11.19 77.27 27.0 44.5 77.2 99.3 11.2 77.29 27.1 44.5 77.0 99.3 0.7 77.20 27.1 44.5 77.5 99.4 0.7 77.30 27.2 44.5 77.5 99.4 0.7 77.31 44.5 77.5 99.4 0.7 87.31 17.1 41.5	50.5	51.99	48.01	49.5	0'89	95.41	98:	32.0
53.96 44.04 48.3 69.0 97.13 2.87 53.97 40.07 48.0 69.5 97.44 2.86 53.87 40.13 47.5 70.0 97.72 2.8 65.348 36.21 46.5 71.0 99.21 1.79 65.348 36.46 46.0 71.2 99.21 1.79 66.34 37.44 46.0 77.5 99.21 1.79 66.15 32.14 46.0 77.5 99.48 1.22 70.88 22.12 44.5 77.5 99.60 0.71 77.34 22.78 44.0 74.5 99.06 0.71 77.34 22.78 44.5 74.5 99.06 0.71 77.34 22.78 44.0 74.5 99.06 0.71 77.34 22.78 44.5 77.5 99.46 0.71 77.34 22.19 47.5 77.5 99.46 0.71 86.43 <	51.0	53.98	46.02	49.0	68.5	96.78	3.22	31.5
57.93 42.07 48.0 69.5 97.44 2.56 53.87 40.13 47.5 70.0 97.72 2.28 65.58 35.21 47.0 70.5 99.21 1.79 65.58 35.24 46.0 71.15 99.21 1.70 65.54 35.24 46.0 77.2 99.24 1.19 66.15 30.85 46.0 77.2 99.24 1.19 70.88 27.13 44.5 77.2 99.6 1.19 70.88 27.13 44.5 77.2 99.6 1.09 70.89 27.13 44.5 77.5 99.29 0.71 70.89 27.13 44.5 77.5 99.29 0.71 70.80 27.14 41.5 76.5 99.29 0.71 70.80 27.14 41.5 77.5 99.43 0.71 88.31 11.51 40.0 77.5 99.43 0.16 88.44 <td< td=""><td>51.5</td><td>55.96</td><td>44.04</td><td>48.5</td><td>0.69</td><td>97.13</td><td>2.87</td><td>31.0</td></td<>	51.5	55.96	44.04	48.5	0.69	97.13	2.87	31.0
59.87 40.13 47.5 70.0 97.72 2.28 63.68 36.24 46.5 71.0 99.98 1.79 65.54 36.64 45.2 71.0 98.21 1.79 65.54 36.64 46.5 71.0 98.21 1.79 65.54 36.64 46.5 71.0 98.21 1.79 66.18 36.64 46.5 77.2 98.21 1.79 70.18 29.12 44.5 77.3 98.42 1.39 70.22 25.74 44.5 77.3 98.29 1.07 70.22 25.74 44.5 77.3 98.42 1.37 70.22 26.74 44.5 77.3 99.36 1.07 70.23 47.5 77.4 99.38 1.07 1.07 70.24 44.5 77.5 99.48 0.34 0.36 80.24 17.11 40.5 77.5 99.48 0.16 80.44	52.0	57.93	42.07	48.0	5.69	97.44	2.56	30.5
6179 38.21 47.0 70.2 97.82 2.2.2 61368 36.22 46.5 71.0 99.82.1 1.79 65.36 32.64 46.5 71.0 98.42 1.79 65.36 32.64 46.5 71.0 98.42 1.79 65.36 32.64 46.5 71.0 98.42 1.39 70.81 29.12 44.5 72.0 98.43 1.12 71.27 22.78 44.5 73.5 99.98 1.07 71.24 22.66 42.5 74.0 99.29 0.71 77.34 22.66 42.5 75.0 99.48 0.71 77.34 22.66 42.5 75.0 99.48 0.71 88.13 19.7 41.5 76.0 99.29 0.71 81.29 17.11 40.5 77.0 99.46 0.47 86.43 17.11 40.5 77.0 99.46 0.47 86.44 <	\$ 25	56.87	4013	47.5	000	7, 70	° C	000
63.65 63.65		61.70			0.07	21:16	97:7	20.0
65.36 37.64 46.5 71.0 98.21 179 65.36 45.4 46.5 71.0 98.21 1.79 67.36 37.64 46.5 72.0 98.21 1.79 67.36 37.64 46.5 72.0 98.21 1.39 70.88 29.12 44.5 73.0 98.23 1.12 77.34 27.78 44.5 74.2 99.66 0.94 77.34 22.66 42.5 74.5 99.46 0.62 77.34 22.66 42.5 75.0 99.46 0.67 77.39 17.14 41.5 76.0 99.46 0.71 88.1 18.41 41.5 76.0 99.46 0.62 84.13 14.46 40.5 77.5 99.46 0.40 86.43 11.51 38.5 78.0 99.78 0.15 86.43 11.51 38.5 79.0 99.81 0.16 86.43 1	33.0	67:19	36.21	0.74	70.5	97.98	2.02	29.5
69.15 3.440 45.0 71.5 98.42 1.28 69.15 3.64 45.5 71.5 98.42 1.28 70.88 2.912 44.5 72.5 98.42 1.28 70.88 2.912 44.5 73.5 98.29 1.17 71.27 2.778 44.0 73.5 99.29 1.17 77.34 2.7.8 42.5 74.5 99.38 0.71 77.34 2.1.9 42.5 75.0 99.38 0.71 80.23 11.5 42.5 75.0 99.38 0.71 81.59 11.19 42.5 75.5 99.46 0.71 81.59 11.11 40.5 77.0 99.46 0.74 81.59 11.51 38.0 77.5 99.76 0.26 81.49 11.51 38.0 79.5 99.84 0.16 81.49 11.51 38.0 79.5 99.84 0.13 81.50	222	03.00	36.32		71.0	98.21	1.79	29.0
67.36 52.64 45.5 72.0 98.61 1.39 70.88 29.12 44.5 73.0 98.61 1.22 70.88 29.12 44.5 73.0 98.93 1.07 74.2 27.43 44.5 74.0 99.08 0.34 74.2 27.73 44.5 74.0 99.18 0.34 77.80 27.70 42.0 74.5 99.18 0.82 77.34 22.66 42.0 75.0 99.48 0.71 80.23 12.19 42.0 75.0 99.48 0.71 81.59 18.41 41.5 76.0 99.48 0.54 81.59 18.41 41.5 76.0 99.48 0.47 81.59 17.11 40.5 77.5 99.74 0.26 86.43 11.51 38.5 79.5 99.74 0.19 86.43 11.51 38.6 37.5 80.0 99.81 0.19 9	0.4.0	45.54	34.40	0.04	71.5	98.42	1.58	28.5
69.15 30.85 45.0 72.5 98.78 1.22 70.88 29.12 44.5 73.0 99.93 1.07 74.25 25.78 44.5 73.0 99.06 0.94 74.20 24.20 43.0 74.5 99.06 0.94 75.80 24.20 42.5 75.0 99.38 0.62 78.81 21.19 42.0 75.5 99.46 0.71 88.1 19.77 41.0 76.5 99.46 0.54 80.23 19.77 41.0 76.5 99.46 0.54 81.59 11.11 40.0 77.5 99.46 0.54 84.13 15.87 40.0 77.5 99.60 0.40 85.31 14.69 39.5 78.0 99.78 0.25 86.43 11.51 38.5 78.0 99.78 0.19 80.44 10.56 37.5 99.78 0.13 90.32 86.49 <t< td=""><td>54.5</td><td>67.36</td><td>32.64</td><td>45.5</td><td>72.0</td><td>98.61</td><td>1.39</td><td>28.0</td></t<>	54.5	67.36	32.64	45.5	72.0	98.61	1.39	28.0
70.88 29.12 44.5 73.0 98.93 1.07 74.24 27.43 44.0 73.5 98.93 1.07 74.25 27.43 44.0 73.5 99.06 0.94 74.25 27.43 44.0 74.0 99.18 0.82 77.34 22.66 42.0 74.5 99.06 0.71 80.23 19.71 41.5 76.0 99.38 0.62 81.59 18.41 41.0 76.0 99.54 0.71 81.59 18.41 41.0 76.0 99.54 0.74 81.59 18.41 40.5 77.5 99.66 0.40 85.31 14.69 39.5 77.5 99.76 0.30 86.49 11.51 38.5 79.0 99.78 0.16 86.49 11.51 38.5 79.0 99.84 0.16 90.22 13.5 35.5 80.0 99.87 0.13 90.22 <td< td=""><td>55.0</td><td>69.15</td><td>30.85</td><td>45.0</td><td>72.5</td><td>98.78</td><td>133</td><td>376</td></td<>	55.0	69.15	30.85	45.0	72.5	98.78	133	376
72.57 27.48 44.0 73.5 99.05 14.0 74.22 27.48 44.0 73.5 99.06 0.94 75.80 24.20 43.5 74.0 99.18 0.82 77.34 22.66 42.5 75.0 99.48 0.71 80.23 19.77 41.5 76.0 99.46 0.54 81.59 118.41 41.0 76.5 99.46 0.54 82.89 17.11 40.5 77.0 99.46 0.54 84.13 15.87 40.0 77.5 99.46 0.54 86.43 15.87 40.0 77.5 99.46 0.26 86.43 11.51 38.0 78.5 99.78 0.26 87.49 11.51 38.0 79.5 99.81 0.19 88.49 11.51 38.0 37.5 80.0 99.87 0.13 91.52 8.88 36.5 35.5 99.84 0.16 <td< td=""><td>5 5 5</td><td>20.88</td><td>29.12</td><td>44.5</td><td></td><td>2000</td><td>1 .</td><td>9 6</td></td<>	5 5 5	20.88	29.12	44.5		2000	1 .	9 6
7422 25.78 43.5 74.0 99.06 0.54 75.80 24.20 43.0 74.2 99.28 0.54 77.34 22.66 42.5 75.0 99.38 0.62 80.23 19.77 41.0 76.3 99.46 0.54 80.23 19.77 41.0 76.5 99.46 0.54 81.59 17.11 40.5 77.0 99.46 0.54 82.89 17.11 40.5 77.0 99.65 0.40 88.41 15.87 40.0 77.5 99.67 0.35 88.43 13.5 39.5 78.0 99.48 0.16 88.49 11.51 38.5 79.0 99.84 0.16 99.25 79.5 99.84 0.16 0.19 99.15 8.68 37.0 99.84 0.16 99.25 7.3 36.5 99.84 0.13 99.25 7.3 36.6 37.0 99.84	. Y	55.07	27.12		75.0	98.93	1.0/	0.72
75.80 25.16 43.5 74.0 99.18 0.82 77.34 22.66 42.5 75.0 99.29 0.71 77.34 22.66 42.5 75.0 99.38 0.62 78.81 21.19 42.0 75.5 99.46 0.54 80.23 13.19 41.0 76.5 99.60 0.47 81.59 18.41 40.0 77.5 99.60 0.47 82.89 17.11 40.3 77.5 99.76 0.30 85.31 14.69 39.5 77.5 99.74 0.26 86.43 11.51 38.0 77.5 99.78 0.26 87.49 11.51 38.0 79.5 99.81 0.16 89.44 10.56 37.5 80.0 99.87 0.13 91.15 8.08 36.5 99.84 0.15 91.32 6.68 35.5 80.0 99.87 0.13 95.94 4.46	2.00	107	0000	9 0	5.57	99.06	0.94	C. 0.2
75.80 24.20 43.0 74.5 99.29 0.71 77.34 22.66 42.5 75.5 99.46 0.62 77.34 21.19 42.0 75.5 99.46 0.54 80.23 19.77 41.5 76.0 99.53 0.47 81.59 118.41 41.0 77.0 99.65 0.40 82.89 17.11 40.5 77.0 99.65 0.47 84.13 14.69 39.5 77.0 99.65 0.33 86.43 11.51 38.0 77.0 99.65 0.35 86.43 11.51 38.0 78.0 99.74 0.26 86.43 11.51 38.0 79.5 99.74 0.15 88.49 11.51 38.0 79.5 99.84 0.16 89.44 10.56 37.5 80.0 99.87 0.13 90.32 94.5 36.8 36.5 36.5 36.5 94.55 <td< td=""><td>20.0</td><td>77.4/</td><td>25.78</td><td>43.5</td><td>74.0</td><td>99.18</td><td>0.82</td><td>26.0</td></td<>	20.0	77.4/	25.78	43.5	74.0	99.18	0.82	26.0
77.34 22.66 42.5 75.0 99.38 0.62 78.81 21.19 42.0 75.5 99.46 0.54 80.23 19.77 41.5 76.0 99.46 0.54 81.29 18.41 41.0 76.5 99.46 0.54 82.89 17.11 40.5 77.0 99.53 0.47 84.13 15.87 40.0 77.5 99.60 0.40 85.31 14.69 39.0 78.5 99.78 0.26 87.49 13.57 38.0 78.5 99.78 0.26 88.49 11.51 38.5 79.5 99.84 0.16 90.32 96.4 37.0 80.0 99.87 0.13 91.52 8.8 36.5 36.5 99.84 0.16 93.32 6.6 34.5 80.0 99.87 0.13 94.52 5.48 34.6 33.5 80.0 99.87 0.13 95.94	57.0	75.80	24.20	43.0	74.5	99.29	0.71	25.5
18.81 21.19 42.0 75.5 99.46 0.54 81.29 19.77 41.5 76.0 99.53 0.47 81.29 18.41 41.0 76.5 99.45 0.54 82.89 17.11 40.5 77.0 99.53 0.40 85.31 18.64 39.5 77.0 99.65 0.30 86.43 15.87 40.0 77.5 99.60 0.30 86.43 13.57 39.0 78.5 99.76 0.26 86.43 13.57 39.0 78.5 99.78 0.22 86.43 11.51 38.5 79.0 99.78 0.16 89.44 10.56 37.5 80.0 99.87 0.16 91.52 8.08 35.0 79.5 99.87 0.13 91.52 8.08 35.0 73.5 80.0 99.87 0.16 93.34 6.68 34.5 33.5 80.0 99.87 0.13	57.5	77.34	22.66	42.5	75.0	90 38	S	75.0
80.23 17.17 41.20 75.21 99.48 0.434 81.59 18.41 41.0 76.3 99.63 0.47 81.59 17.11 40.5 77.0 99.53 0.47 84.13 15.87 40.0 77.5 99.65 0.30 86.43 15.87 40.0 77.5 99.65 0.35 86.43 13.57 39.0 78.5 99.74 0.26 86.43 13.57 39.0 79.6 99.78 0.19 86.49 11.51 38.0 79.5 99.84 0.16 89.44 10.56 37.5 80.0 99.87 0.13 90.32 8.68 36.3 36.3 36.3 0.13 91.15 8.88 36.3 36.3 36.3 0.13 93.24 6.68 35.0 34.5 34.5 0.13 95.54 4.46 33.0 99.84 0.13 95.54 4.46 33	200	78.91	91.10	200	9 9 5	90.00	70:0	5 4
84.13 18.11 41.0 70.0 99.53 0.47 82.89 17.11 40.5 77.0 99.65 0.40 84.13 15.87 40.0 77.5 99.60 0.40 85.31 14.69 39.5 78.5 99.70 0.30 86.43 13.57 39.0 78.5 99.74 0.26 86.43 13.57 39.0 78.5 99.74 0.26 86.43 13.51 38.5 79.0 99.78 0.19 87.49 11.51 38.5 79.0 99.81 0.19 89.44 10.56 37.5 80.0 99.87 0.16 90.32 96.8 36.0 36.3 99.87 0.13 91.92 8.08 36.0 36.3 36.3 91.92 6.68 36.0 34.5 34.5 95.94 6.06 34.5 34.5 34.5 95.94 4.46 33.0 33.5 34.0 95.94 4.46 33.0 33.5 33.5	2 0 0	10:01	10.12	0.21		99.46	0.54	24.5
84.13 118.41 41.0 76.5 99.60 0.40 84.13 15.87 40.5 77.0 99.65 0.35 84.13 15.87 40.0 77.5 99.60 0.35 86.43 14.69 39.5 78.0 99.74 0.26 86.43 13.57 39.0 78.0 99.74 0.26 87.49 12.51 38.5 79.0 99.81 0.16 87.49 11.51 38.0 79.5 99.84 0.16 89.44 10.56 37.5 80.0 99.87 0.13 90.32 96.8 36.5 80.0 99.87 0.16 91.15 8.85 36.5 80.0 99.87 0.13 91.25 8.08 36.5 36.5 80.0 99.87 0.13 93.24 6.68 35.5 34.5 84.5 94.5 94.5 95.94 4.46 33.0 44.4 33.0 95.9 99	700	80.23	19.77	5.14	76.0	99.53	0.47	24 0
84.13 17.11 40.5 77.0 99.65 0.35 84.13 15.87 40.0 77.5 99.70 0.30 85.31 14.69 39.5 78.5 99.74 0.26 86.43 13.57 39.0 78.5 99.78 0.26 86.43 13.51 38.5 79.0 99.78 0.26 87.49 11.51 38.0 79.0 99.84 0.16 89.44 10.56 37.5 80.0 99.87 0.13 91.5 8.08 36.0 99.87 0.13 91.5 8.08 36.0 99.87 0.13 91.5 8.08 36.0 99.87 0.13 93.32 6.68 35.0 34.5 94.5 5.48 34.0 34.5 95.05 4.46 33.0 33.5	29.0	81.59	18.41	41.0	76.5	09 66	0.40	23.5
84.13 15.87 40.0 77.5 99.70 0.30 85.31 14.69 39.5 78.0 99.74 0.26 86.43 13.57 39.0 78.5 99.78 0.26 87.49 12.51 38.5 79.0 99.81 0.19 87.49 11.51 38.0 79.5 99.84 0.16 89.44 10.56 37.5 80.0 99.87 0.16 91.15 8.85 36.5 80.0 99.87 0.13 91.15 8.85 36.5 80.0 99.87 0.13 91.15 8.85 36.0 36.0 99.87 0.13 93.32 6.68 35.0 34.5 34.0 34.5 84.5 94.52 5.48 34.0 33.5 44.4 44.4 44.4 44.4 44.4 44.4 44.4 44.4 44.4 44.4 44.4 44.4 44.4 44.4 44.4 44.4 44.4 44.	59.5	82.89	17.11	40.5	77.0	89.66	0.35	23.0
85.31 14.69 39.5 78.0 99.74 0.26 86.43 13.57 39.0 78.5 99.78 0.22 87.49 12.51 38.5 79.0 99.78 0.22 87.49 11.51 38.0 79.0 99.81 0.19 89.44 10.56 37.5 80.0 99.87 0.16 90.32 90.32 36.3 80.0 99.87 0.13 91.15 8.85 36.5 99.87 0.13 91.52 8.85 36.5 99.87 0.13 92.65 7.35 35.5 80.0 99.87 0.13 94.52 5.48 34.5 94.5 34.5 95.9 95.94 4.46 33.0 93.3 80.0 99.87 0.13	0.09	84.13	15.87	40.0	17.5	99.70	0.30	22.5
86.43 13.57 39.0 78.5 99.78 0.22 87.49 12.51 38.5 79.0 99.81 0.19 88.49 11.51 38.0 79.5 99.81 0.19 89.44 10.56 37.5 80.0 99.87 0.16 90.32 9.68 37.0 99.87 0.13 91.15 8.85 36.5 91.35 0.13 91.25 8.08 36.0 36.0 99.87 0.13 93.32 6.68 35.0 34.5 94.5 94.52 5.48 34.0 34.5 94.5 95.94 4.46 33.0 4.46 33.0	60.5	85.31	14.69	39.5	78.0	99 74	0.26	22.0
87.49 12.51 38.5 79.0 99.81 0.19 88.49 11.51 38.0 79.5 99.84 0.16 89.44 10.56 37.5 80.0 99.87 0.16 90.32 9.68 37.0 99.87 0.13 91.92 8.08 36.5 8.08 36.0 92.65 7.35 35.5 8.08 35.0 93.32 6.68 34.5 34.0 95.05 4.95 33.6 33.5 95.94 4.46 33.0	61.0	86.43	13.57	39.0	78.5	82.66	0.22	21.5
88.49 11.51 38.0 79.5 99.84 0.16 89.44 10.56 37.5 80.0 99.87 0.16 90.32 9.68 37.0 80.0 99.87 0.13 91.15 8.85 36.5 80.0 99.87 0.13 91.92 8.08 36.0 36.0 99.87 0.13 93.32 6.68 35.0 34.5 94.5 94.52 5.48 34.0 33.5 95.04 4.46 33.0 33.5	61.5	87.49	12.51	38.5	79.0	99.81	0,19	21.0
89.44 10.56 37.5 80.0 99.87 0.13 90.32 9.68 37.0 90.37 0.13 91.15 8.85 36.5 91.92 8.88 36.0 91.92 8.08 36.0 36.0 93.32 6.68 35.0 34.5 93.94 6.06 34.5 34.0 95.05 4.95 33.5 95.94 4.46 33.0	62.0	88.49	11.51	38.0	79.5	99.84	0.16	20.5
90.32 9.68 37.0 91.15 8.85 36.5 91.92 8.08 36.0 92.65 7.35 35.5 93.32 6.68 35.0 93.94 6.06 34.5 94.52 5.48 34.0 95.94 4.46 33.0	62.5	89.44	10.56	37.5	C	00 87	0.13	000
91.15 8.85 91.92 8.08 92.65 7.35 93.32 6.68 93.94 6.06 94.52 5.48 95.05 4.95	63.0	90.32	89.6	37.0	9			2
91.92 8.08 92.65 7.35 93.32 6.68 93.94 6.06 94.52 5.48 95.05 4.95	63.5	91.15	8.85	36.5				
92.65 7.35 93.32 6.68 93.94 6.06 94.52 5.48 95.05 4.95	3	91.92	80.8	36.0				
93.32 6.68 93.94 6.06 94.52 5.48 95.05 4.95 95.94 4.46	64. 5	92.65	7.35	35.5				
93.94 6.06 94.52 5.48 95.05 4.95 95.94 4.46	65.0	93.32	99.9	35.0				
94.52 5.48 95.05 4.95 95.94 4.46	65.5	93.94	90.9	34.5				
95.05 4.95 95.94 4.46	0.99	94.52	8,5	34.0				
95.94 4.46	66.5	95.05	4.95	33.5				
	67.0	95.94	4.46	33.0				
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